The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 47. NOVEMBER 24, 1934. VOL. XIV.

General Articles

THE CONTROL OF CONTAGIOUS ABORTION*

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Introduction and General

The control of contagious bovine abortion presents problems to veterinarians second in importance only to those of tuberculosis, and I desire to thank you for inviting me to address you on this important disease. You are aware, of course, that the subject has recently been fully discussed by prominent members of our profession, and I am conscious of my inability to add anything of material value to your deliberations. Nevertheless, the greatest possible benefit may result from a full and free interchange of ideas, and I trust that everyone present will take the opportunity of contributing the fruits of his experience to the general discussion.

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Within living memory the history of cattle abortion has been punctuated by a chain of scientific discoveries, which not only have added to our knowledge, but have stimulated the expectation that veterinary science was at length equipped with knowledge sufficient to control the ravages of the disease, if not to eradicate it entirely. Thus, in 1876, Franck, experimenting with vaginal discharges, established the infectious nature of the disease, and twenty years later Bang isolated the well-known micro-organism—which until recently bore his name—from the discharges of an aborting cow, and conclusively proved its rôle in the propagation of the disease. This key discovery was followed by intensive researches in Britain, on the Continent of Europe and in the United States, and gradually the modes of infection were determined and various methods developed for accurate diagnosis. As early as 1902 immunisation experiments were undertaken by Bang and Stribolt, who claimed good results against natural and artificial infection from the use of living culture vaccines. Later, similar experiments were conducted in Britain by M'Fadyean and Stockman, and in Germany by Zwick and Gminder. The encouraging results which these workers obtained paved the way for the general release of living vaccines, and for more than 20 years inoculations with live bacilli have been carried out extensively in practice.

The work of certain American bacteriologists during the Great War, and notably that of Miss Alice C. Evans (1918)—who was investigating the affinities of allied groups of micro-organisms, and in particular those of the causative organism of "Malta" or undulant fever, the so-called *Micrococcus melitensis*—led to the astonishing discovery of the great similarity between melitensis and the common cause of cattle abortion. The conclusion arrived at by these workers, and since amply confirmed by others, was that these two micro-organisms cannot be distinguished on morphological or biochemical grounds, and that the gap separating them, once thought to be so wide, is in reality very narrow. Although these micro-organisms are similar and obviously related, they are not identical, and can be distinguished serologically. Further, there exists a well-marked distinction in their all-important property of pathogenicity; otherwise as pointed out by Edwards in 1921, in view of what was known regarding the excretion of the abortion bacillus in milk and the question of chronic carriers, a large percentage of the milk-drinking population, and especially children, would be liable to infection. When Miss Evans published her important discovery, however, there was no evidence that the consumpion of milk or cream from aborted cows constituted a source of danger to human beings. Later, in view of the close relationship between these micro-organisms, a new bacteriological genus was created—Brucella—which now includes *Br. abortus* and *Br. melitensis*.

The remainder of the story is recent history, and though familiar, may be recapitulated briefly. Stimulated by this newer knowledge, medical workers, particularly in the United States, kept a close watch for evidence of *Br. abortus* infection in man, and many laboratories instituted routine tests on Widal and Wassermann sera. In 1921 Bevan delivered a paper to the Southern Rhodesian Veterinary Association in which he cited strong circumstantial evidence pointing to human Brucella infections of bovine origin, and this pioneer contribution was followed during the next few years by evidence which definitely settled the question in the affirmative. Nowadays no one doubts that, under circumstances as yet imperfectly understood,

* Paper presented at a meeting of the North of England Division, N.V.M.A. held at Newcastle-on-Tyne, September 22nd, 1934.

Br. abortus of bovine origin may occasionally be responsible for causing a serious undulating and prolonged fever in man which closely resembles undulant fever due to *Br. melitensis*. The public health aspect of the problem has recently been reviewed by Wilson, Dalrymple-Champneys, Andrews, McAllan and others (N.V.M.A. Congress Reports, 1932, 1933), and although additional information is needed, it is fairly evident that the question of human infection depends upon a variety of influences, such as individual susceptibility, the virulence of infecting strains and the channels of infection. Its peculiar incidence in males and occurrence in rural districts of Denmark, has led Kristensen to regard it mainly as an occupational disease. On the other hand, Wilson believes that the vehicle of infection in the human subject is usually milk or cream. That there exist considerable differences in the strain virulence of *Br. abortus*, is now acknowledged by the leading investigators and the writer agrees with McAllan (Llandudno, 1933), who stated that he was inclined to think that the whole incidence of the disease depends on a further study of these.

By September, 1933, and including possible errors in diagnosis, less than 200 definite cases of human infection had been recorded in Britain. The comparative infrequency of human cases, while it may have stayed the hand of the legislator, has not diminished the importance of the discovery, which has renewed scientific interest and focussed the attention of the medical and veterinary professions in all parts of the civilised world. Consequently, it is not at all surprising that in the flood of new literature which has arisen around the subject, the present methods of dealing with the disease in cattle should have been examined carefully, and considerable controversy centred around the practice of vaccinating animals with the living causative agent of the disease.

As veterinarians, we are concerned primarily with controlling the disease in cattle, and it goes without saying that the methods we employ should, as far as possible, be beyond reproach. It is a chastening thought that, despite the above development in the history of abortion disease, little or no progress has been made since the War, towards devising more satisfactory and up-to-date measures for control. That the greatest difference of opinion still exists as to the effects of vaccination and the fate of the living organism in the animal body may be illustrated by interpolating a few quotations from reports on the recent discussions at Folkestone and Llandudno (N.V.M.A. Congress Reports, 1932, 1933). Thus Minett (1932) stated that "Vaccination of itself does nothing to eliminate infection from a herd." Wooldridge (1932) stated "if they did resolve to use it (live vaccine), they had no hope of eradication of the organism, and hence the disease, at all." On the other hand, Andrews (1932) was of opinion that on the evidence available, he believed that when virgin heifers were inoculated under the conditions and with the restrictions advised in connection with the vaccination, they usually freed themselves of infection. A similar view was expressed by Andrews (1933), who wrote: "Where the inoculated strain is of suitable virulence, there is reason to believe that the great majority of the animals will rid themselves of the infection." Montgomerie (1933) reported that he had examined nine virgin heifers from before vaccination until after conception and calving, and the results satisfied him that live vaccine had failed to infect any of these maiden heifers. From the evidence which I have been able to collect, I do not think that vaccination, as ordinarily used, is an active agent in causing permanent infection and spreading of the disease.

The manner in which vaccination has hitherto been used in our herds, is not one which is likely to lead us to definite conclusions on the above points, and it seems unfortunate that, so far, it has not been possible to arrange controlled tests on a scale large enough to remove all doubt and disarm the criticism which is levelled against this still occult process. The extent of infectious abortion in this country is not accurately known, but in herds with quite ordinary histories it is common to find 30 or 40 per cent. reactors to the blood test. An interesting side-light on the disease was revealed recently in the *Lancet* (1934, *1*, 18, p. 967) in an article by Pullinger, who reported that he had examined 101 milk samples from designated herds (Certified and Grade A (T.T.)) by the guinea pig test, and 70 per cent. of these samples contained *Br. abortus*. Is it too much to expect that at least our graded milk should be entirely free from this potentially pathogenic organism? The state of affairs disclosed by the above enquiry strongly emphasises the need for a more active policy against abortion disease in cattle. At the present moment, when the entire milk industry is in the process of reconstruction, I feel that veterinary science is in a strong position to contribute to its rebuilding upon sound progressive lines by showing how those diseases which clog the wheels of efficiency may be controlled. For some time now I have been interested in the control of abortion, and in what follows I will endeavour to discuss several of the more difficult and controversial aspects of the disease and its control. Finally, I shall try to show you that total eradication of contagious abortion is not merely a theoretical speculation, but on the contrary is full of practical possibilities for the live-stock industry, and opens a new field of great usefulness to the veterinary profession.

The Agglutination Test

The pioneers in applying this test to the diagnosis of abortion infection in cattle, were M'Fadyean and Stockman in this country and Holth and Wall in Denmark. The reaction depends upon a test-tube demonstration of a substance present in the blood serum of affected animals, which has the property of clumping *Br. abortus* into large colonies when the serum to be tested is mixed and incubated with an opaque suspension of the micro-organism. All that is required is about 3 c.cm. of blood taken from the jugular or mammary veins, allowed to clot and dispatched to the laboratory. The test is not a perfect one and it is doubtless true that a small number of infected animals may give a negative result. Nevertheless, an enormous amount of testing during the last 20 years has established its value beyond all dispute, and on account of its particular reliability and technical simplicity, the agglutination test has gradually superseded all others in routine diagnosis. I have used the rapid method of Huddleston, but prefer the slower method which I think is more reliable. This remark likewise applies to methods involving the use of whole-blood. Such methods are undoubtedly rough and ready and I cannot see that practitioners have any real need of them. Anyhow, in my hands they have failed to detect moderately high titred reactors.

Since 1930, I have had the opportunity of supervising eradication of abortion from several herds in the North of England. This has been undertaken by systematic blood-testing and disposal or segregation of reactors. In testing, I have followed the method of M'Fadyean and Stockman, using a polyvalent antigen composed of five different strains of *Br. abortus*, killed with minimum heat and suspended in 0·9 per cent. saline to a convenient density. Within limits, I have found that the density of the suspension does not matter greatly, but it is important to keep it below the point of non-specific sedimentation and to employ controls. The dilutions of serum and antigen in routine use are 1:20, 1:40, 1:80, 1:160, and doubtful sera or check tests are extended in both directions, frequent use being made of antigens suspended in varying amounts of saline up to 12 per cent. Tests are incubated in a water bath running at 54°C. for six hours. My strains are periodically tested for roughness according to Professor Wilson's technique.

I have dealt elsewhere with what I regard as a positive reactor (*Vet. J.*, 1933, Vol. 89, No. 12), and here it may suffice to state that any degree of visible agglutination in a serum-antigen dilution of 1 : 40 is considered positive. If, after check tests, a doubtful reaction persists in this dilution, the animal is classified as doubtful, and I think that such a reaction indicates a transient phase in her abortion status. Such an animal must be re-tested, and I may remark that of 14 doubtful reactors that I have been able to follow up, 12 have become positive. This method of reading the tests must be considered severe, and may yet be shown to be unnecessarily strict. Experiments conducted by Cotton and Buck in America have led these workers strongly to suspect that a titre of 1:50 may indicate arrested infection and some degree of acquired immunity, and the possibility of udder infection in these animals is certainly remote. On the other hand, in cattle which are demonstrably free from abortion infection, such as calves and male animals, it is rare to obtain any agglutination in a dilution of 1:10, and I have been led to the opinion that the above is a safe, if somewhat conservative rule in interpreting the test.

While dealing with the interpretation of the blood test, I would like to refer to a point which has always puzzled me. If we enquire into the theory of agglutination, we find that agglutinins belong to a class of auxiliary defensive substances, called forth in quantity to assist phagocystosis by the stimulation of specific infection, or to make use of the descriptive words of Wright "to toast and butter the bacilli and prepare them for the phagocytic feast." If this is assumed to be correct, it is clear that the presence in the blood of an abnormally large amount of agglutinin, is related to the body defences and to the processes of immunity. Generally speaking, about 80 per cent. of cows that abort once, will subsequently carry their calves to full term, and this fact is taken to indicate the possession of a degree of active immunity against the act of aborting. This corresponds to observations in herds of goats where *Br. melitensis* is enzoötic. In such herds the act of abortion is uncommon, but in "unprotected" herds where the infection is introduced, abortion is common and the aborted material is highly infectious. (M.R.C. System of Bacteriology.) The leading investigators have all testified to the long persistence of *Br. abortus* in the bodies of cows which, having aborted once are apparently immune, and the organism shows a marked predilection to colonise in the udder and associated lymphatic glands. These facts have given rise to the view that the type of immunity present is an "infection immunity," which lasts just so long as and not longer than the persistence of infection in the animal. It is a comparatively easy matter to isolate *Br. abortus* from the milk of cows with pronounced blood reactions, but I have always failed to obtain the micro-organism from animals with a blood serum titre of less than 1:80. Now, the question arises as to whether or not such animals, which have suffered from a slight natural or artificial infection, and from which *Br. abortus* cannot be detected, possess any bacteriological immunity. Further, does a recovered cow which in time

ceases to react at all to the blood test, retain some sort of occult protection against reinfection? If so, she is a valuable animal.

I have, of course, drawn on the theoretical picture, and although the above questions cannot as yet be answered with any precision, we do know that agglutination implies infection. It is also known that recovery from natural infection is frequently very protracted, and since the milking life of a dairy cow is estimated at the low average of 3½ to 5 years, true recovery from natural infection may well be a termination of little practical importance. I am far from convinced, however, that an artificial infection as ordinarily transmitted by the inoculation of live culture, comes into quite the same category, and there is a real need for fuller information on this point.

Vaccination with Living Br. Abortus Cultures

Vaccines composed of heat-killed cultures of *Br. abortus* have been shown from Bang's time onwards to be comparatively ineffective in protecting seriously threatened cattle against the act of abortion. Attenuated vaccines treated with chloroform, toluol, formalin, etc., are still very much in the experimental stage and hitherto the only method of immunisation that has achieved any degree of reputation, is by the inoculation of living unattenuated cultures. After more than 20 years' experience of the extensive use of this treatment, which has been carried out in thousands of herds in this and other countries, it is curious that it has failed to gain general confidence, and to-day the most diverse opinions prevail as to the effectiveness of vaccination, as well as to its safety and the fate of the micro-organisms in the animal body. It is no exaggeration to state that our knowledge on vaccination against cattle abortion is terribly fragmentary, and further work into immunity problems is urgently needed and should receive our whole-hearted support.

Sir John M'Fadyean has recently pointed out that there is at present no scientific proof of the efficacy of the inoculation method. That such proof is still lacking is due to a number of causes, among which is the inherent difficulty of arguing from effect to cause, and to the impossibility of leaving an adequate number of untreated control animals in herds where the vaccine has been used. While one is forced to agree with Sir John, I think that significance must attach to the opinions of most writers on the subject, who appear to agree that the numbers of abortions decrease following the use of live vaccines. To be sure, the method is far from perfect, the results are frequently variable, and in any case live vaccine does not always reduce abortions to a desirable minimum, but it is noteworthy that even its severest critics do not deny that its use does bring about some appreciable good. It is probably true that these opinions are mostly of the nature of general impressions rather than strict scientific evidence. Field evidence on vaccination is notoriously unreliable in a disease like contagious abortion, since cows which abort once will mostly carry their calves whether treated or not, but Dr. Andrews has studied this point and I cannot do better than quote from his recent paper (Llandudno, 1933).

Dr. Andrews wrote: "Giving due weight to these considerations, it appears that one is justified in attaching importance to field evidence that has been gathered from a wide area and over a considerable period of time." Andrews also stated: "It can scarcely be doubted that in the great majority of instances the *apparent* results (of live vaccination) are good, *i.e.*, that after the inoculation the number of abortions falls greatly."

This appears to parallel closely what is said to happen in the case of Maltese goats. In many of these herds *Br. melitensis* infection has been enzoötic for centuries and abortion is not a common occurrence, but "an epidemic of abortion may be expected to follow the introduction of an infected goat into an "unprotected flock." (M.R.C. System of Bacteriology.) Thus, it cannot be said that the characteristics of the Brucella group offer any great barrier to the acceptance of the principle that infection in the herd has a certain value in reducing the abortion rate in cattle, although the means by which this is brought about may be open to the gravest criticism. In 1921, Edwards (N.V.M.A. Congress Report), voiced the opinion that the protection induced in cattle is of the nature of an "infection immunity" against the act of aborting, but was precluded from following this opinion to its logical conclusion and saying in effect "no immunity without infection" by the peculiar resistance to permanent infection evinced by calves. The infection immunity idea, however, finds its echo in current teaching to the effect that by vaccination, it is at best only possible to reduce the number of abortions by producing or prolonging latent infections. Now, it is clear that this invokes a theoretical point of great practical interest, because if immunity to abortion is dependent upon infection, it should be capable of detection by the agglutination test. In other words, so long as an animal is immune, she will react to the blood test, but is the return to a negative status an indication of loss of immunity? This is a point upon which more information is needed. By vaccinating heifers two months prior to service it has generally been considered that they can be rendered more resistant to abortion, and that in these animals there is little risk of setting up permanent udder infections. According to the above theory, such animals are not really immune, and it could be

argued that the apparent good results are due to improved herd hygiene reducing the risk of infection. I myself, know of herds producing graded milks, where management is definitely good, but all the incoming heifers are systematically inoculated with living vaccine, and one may wonder with justification, just how much the good results are in reality due to vaccination.

The idea underlying "infection immunity" or "saturation tolerance" is objectionable from every point of view, and it is gratifying to be able to record interesting new work on this problem from the United States. Some time ago the American Veterinary Medical Association adopted schemes for the eradication of infectious abortion by blood-testing and segregation of reactors as its official policy, but mainly through the influence of Dr. Cotton—whose work on abortion is of a high order—interest in vaccination has not been allowed to lapse. Indeed, the Bureau of Animal Industry has devoted considerable attention to it, since it was realised that the only alternative to perfecting safe and effective methods of immunising cattle was the complete abandonment of vaccination. Dr. Andrews, at Llandudno last year, called our attention to an important experiment by Cotton, Buck and Smith (*Journ. Agric. Res.*, 1933, Vol. 46, No. 4), which I may briefly recall. Three different strains of *Br. abortus* of low, medium and high virulence were inoculated into three groups of cows and heifers at least two months prior to service. Later, all these animals, together with a number of control heifers, were tested for immunity by depositing virulent culture in measured quantity on the conjunctiva. The infection was severe enough to cause seven out of the eight control heifers to abort, but no abortions occurred among the 23 vaccinated cows and heifers. These workers were able to conclude that vaccines prepared from strains of *Br. abortus* of greatly reduced virulence, as tested by guinea pig inoculations, gave evidence of being reasonably efficient as immunising agents, and the danger of implanting the organism in the mammary gland with such a vaccine is very slight.

Reference should be made to a further article by Cotton and Buck (*Journ. A.V.M.A.*, 1934, Vol. 37, No. 3), in which experiments on calfhood vaccination are recorded. In one experiment conducted by the Bureau, eight calves were vaccinated with a virulent *abortus* strain, and nine with a strain of low virulence, with the object of determining whether or not these strains differed in their immunising value. These animals were subsequently bred and exposed during their first pregnancy to infection from a virulent *Br. abortus* strain. Sixteen of the vaccinated animals produced vigorous calves and one a weak calf. Of the sixteen control animals, seven aborted, three produced weak calves, while six produced vigorous calves. *Br. abortus* was proved to be present in the uterus and/or colostrum of twelve of the control heifers, as well as in the uterus and colostrum of the principal heifer which produced the weak calf. One point of great interest is that five months after vaccination, the principals in this experiment were either negative to the blood-test or had titres no higher than 1:50, with one exception. This animal had received the virulent strain, but its reaction dropped two months later to 1:50. Thus, it seems rare for vaccine, even when prepared from virulent strains, to remain long in the bodies of calves as judged by agglutination tests, but the transient infection which the vaccines called forth did appear to leave behind an occult something which rendered these animals more resistant to the act of abortion. Experiments such as this are of great importance, and one would like to see them extended and duplicated in Britain, because if calves can be immunised without risk, the tremendous advantage of calfhood vaccination will be apparent to everyone. It will be recalled that the Ministry of Agriculture advises that heifers should not be served until two months after vaccination to allow the animals to overcome the infection. The experiment quoted from Cotton and Buck indicates that increasing this interval from two to eighteen months is equally effective, and on general grounds one would expect it to be safer.

The Persistence of Agglutinins in the Blood of Vaccinated Cattle

In carrying out agglutination tests I have from time to time noticed that many vaccinated cattle in infected herds fail to react. In view of the dictum "once positive, always dangerous," such results are somewhat surprising, especially in the case of recently vaccinated heifers. I have wondered if further enquiry on this point would throw light upon the question of immunity and the distinction between a natural and an artificial infection. Through the kindness and interest of several practitioners, I have been able to blood-test cows in herds where vaccination with live culture has been carried out for years, and I will briefly summarise the information obtained.

Herd No. 1.—Graded, self-contained herd. Abortion prevalent 15 years ago, since when all in-coming heifers and certain cows have been vaccinated. Clinical abortion has never entirely disappeared but is limited to one or two cases per year. The heifers have bred regularly, but a little difficulty has been experienced in the case of the cows, which frequently return to the bull. In general, cows are vaccinated only if it is suspected that they have aborted. In 1934 a complete herd test showed 18 per cent. of reactors. Only three cows reacted in a dilution of 1:80, and the milk of these cows was

examined by the guinea pig test, with negative results. Of the animals tested, ten were heifers in milk and not one reacted in a titre of 1:40.

Herd No. 2.—Graded herd tested in 1930 and again in 1934. At the first test 50 per cent. of the animals of breeding age were positive. Abortion was then prevalent and in an endeavour to check this, all animals were vaccinated piecemeal with live culture as they became due. When tested in 1934 only nine of the original animals remained, and in seven cases their reaction was unchanged or progressed to positive. One positive cow had become negative, while another had become doubtful. In the interval 22 heifers had been recruited to the herd, and despite the fact that these animals were all vaccinated, the 1934 test disclosed only two new reactors. Six in-calf heifers tested within one year of live vaccination proved to be negative. There have been no abortions since 1931.

In all, I have applied the blood test to 50 heifers, either in-calf or in-milk, and although all have been exposed to some degree of natural infection, yet only six proved to be positive. This accords with the findings of Cotton and Buck, and it is in line with the opinion of Andrews (*vide supra*) and with the experiment already noted conducted by Montgomerie. Consequently, from evidence I have obtained I am inclined to draw the following conclusions.

(1) Vaccination has not been an active agent in spreading the disease.

(2) If vaccination had not been undertaken in Herd No. 2 in 1931, the number of additional reactors could scarcely have been less than two by 1934.

(3) There would appear to be a significant difference between a natural and an artificial infection. The first is highly dangerous, but the latter seems comparatively safe, and most vaccinated heifers subsequently pass the blood test.

(4) The in-coming heifers presumably were resistant in some degree to abortion, since segregation of reactors in the above herds was not attempted.

(5) If they were in fact resistant, this resistance is not shown by the blood test in the majority of cases.

In my opinion vaccination as at present developed is an unsatisfactory method of dealing with abortion, and should only be used in herds after the possibility of eradication has been fully explored and found to be impracticable. At the same time, I feel that the scientific dissatisfaction with vaccination may be due to an insufficiency of exact data, because if the experiments indicated above were elaborated and extended, vaccination might well prove to be an invaluable preliminary to eradication. Further, if calfhood vaccination can be shown to raise the resistance of young stock to the act of abortion, no one will doubt that it will play an important part in the ultimate control of the disease.

The Eradication of Abortion

Controlling abortion by an eradication policy involves no departure from principle, and, broadly, is that which is applicable to all contagious diseases, *viz.*, the detection and segregation of the affected, and the taking of such precautions as will prevent infection spreading to other cattle in the uninfected units. Hitherto, no serious attempt has been made to apply this policy to contagious abortion, partly owing to the fact that the majority of cows which abort acquire a degree of saturation immunity which enables them to carry their calves in subsequent pregnancies, and partly because a certain satisfaction has existed with regard to live vaccination. Again, about 50 per cent. of the herds in Britain are said to be not of the self-contained type, and where the composition of the herd is constantly changing, there is great difficulty in avoiding the introduction of the disease. On the other hand, a recent enquiry into the causes of wastage in dairy herds, comprising figures from widely separated parts of the country, showed that the average annual wastage from abortion and sterility was 26·8 per cent. (Rep. Advisory Economic Council, 1934. Com. Cattle Diseases.) The average figure for sterility is a high one (23·8 per cent.), and the most common cause of sterility is abortion. I have already illustrated how the milk yields are commonly depressed following abortion (Stewart and Westwater), and we all know that shy breeding, which is a frequent sequel to abortion, constantly interrupts and complicates the management of the dairy. I believe that on economic grounds alone there is every justification for thinking that eradication is the most profitable policy, as I believe that the general and breeding health of cattle is better in an abortion-free herd. In addition, it is incumbent upon us all to remember the public health urge, and whenever consulted, veterinarians should always carefully explain and recommend an eradication policy, which I think is applicable to all self-contained herds. By thus moving the emphasis to the preventive side of our occupation, it need hardly be said that we stand to lose nothing; on the contrary, the general adoption of eradication puts the initiative into the hands of practitioners, and will do much to counter the suggestion that only the official is capable of prosecuting work on the prevention of epizoötic diseases.

At the present time I have six herds under test for abortion, and I have reason to believe that three herds are entirely free from the disease. One herd has had no reactors for 3½ years and another for two years. In the third herd I experienced a breakdown, and this was due to an oversight in omitting to carry out a bi-annual test. This herd is again free and forms an illus-

tration of the fact that once the infection has been eradicated, it is essential to test the cows twice per year. I would emphasise my belief that eradication is not really a difficult process in self-contained herds. Given intelligent co-operation between the farmer, the veterinary surgeon and the laboratory, eradication is much easier than I formerly thought. On one farm which has been clear of abortion for two years, the reactors were all segregated on the same premises as the healthy cows—there are still three reactors on this farm—and yet the process went on in an orderly manner. Even if we do not succeed in eradicating the disease entirely, we are certain to do some good, and this partial success will have the effect of decreasing the weight of infection on the premises. I do not agree that abortion-free cows are necessarily more susceptible to *Br. abortus* infection than was the case prior to its eradication. The converse is nearer the truth.

The procedure to be followed in eradicating contagious abortion from self-contained herds has frequently been set out, but for completeness, I will conclude my address by referring to the points which I have found to be of major importance.

(1) An initial test of all breeding animals in the herd which are over twelve months. Testing must be repeated at monthly intervals until two successive tests show no reactors. The herd should then be blood-tested twice annually.

(2) The disposal or segregation of reactors. If segregation is adopted it is necessary to provide separate pastures, and a separate door into the cowshed.

(3) Segregation during the winter months may vary from entirely separate buildings and attendants to partial segregation under the same roof.

(4) Maternity boxes must be provided in the buildings. All cows, whether reactors or not, should be allowed to calve in these boxes. This is particularly advisable in the case of reactors. Cows should remain in the maternity boxes until ten days after calving, or until all discharge has ceased. The cleansing and disinfection of these boxes is a matter which requires superintendence.

(5) All necessary herd replacements must be purchased subject to the blood test carried out on the vendor's premises. After delivery, such animals—which preferably should be free of the bull—must be isolated for one month, retested, and admitted to the herd only if the second test is negative.

I should like to thank my good friends the practitioners for the help they have accorded me in the collection of data which has been of great value in the preparation of this paper.

The foregoing paper had been circulated in advance of the meeting at which it was presented, and the essayist made the following introductory observations to the discussion:—

I think I should have added a brief summary to the somewhat lengthy paper which is now before you, but perhaps you will allow me to emphasise one or two important points. On the blackboard I have reproduced a table prepared by Mr. Westwater and myself from figures supplied by dairy farmers, and it illustrates how the milk-yield may be depressed in valuable cows following abortion.

TABLE SHOWING HOW LACTATION YIELDS MAY BE DEPRESSED THROUGH ABORTION

Gallons of Milk

Cow.	1926-27	1927-28	1928-29	1929-30	1930-31
1	1,401	1,500	1,122	$A_8$832	1,007
2	1,063	1,062	$A_7$870	977	Died
3	1,028	947	A 748	940	1,233
4	752	$A_6$263	—	—	—
5	560	536	$A_7$291	—	—
6	1,030	$A_7$561	1,070	—	—
7	850	A 714	862	—	—
8	730	1,050	896	$A_8$324	912

A = Aborted; small figures indicate months. Lactations per milk recorded year.

We all know the difficulty of assessing accurately the losses produced by this disease, and for this reason some recent figures taken from the Cattle Diseases Committee's Report are of great interest. On page 11 of this Report will be found a table which summarises the causes of the disposal of dairy cows. This embraces figures obtained in three widely separated parts of the country, and they agree in showing that a large proportion of cows are disposed of on account of diseases of the reproductive organs. The average figure is 26·8 per cent. This is made up of abortion and sterility, and there is little doubt that sterility is most frequently caused by abortion. Some idea of how great is the wastage in dairy cows may be gathered from the fact that the estimated average life of a dairy cow is only about 4½ years. I feel confident that this figure of 4½ years could be greatly extended if more attention were to be paid to the preventive side of cattle diseases, and the eradication of abortion would amount to a valuable first step.

Perhaps it would have been wiser to have commenced my paper with an account of the process of eradication of abortion, and not to have tacked it on at the end as though of minor importance. At the College here we are in fairly close touch with agricultural opinion in general, and there can be no doubt that the idea of eradicating the disease by blood testing and segregation is slowly gaining ground. Dr. Stableforth

has had more experience of eradication, and will tell us whether or not he considers it a difficult process. Personally, I do not think that it is, given intelligent management and self-contained herds. But I feel sure it is an economic proposition. Not only is the general level of health better in an abortion-free herd, but surplus stock is definitely more valuable. In my view, veterinarians should recommend eradication wherever there is the slightest chance of its proving successful.

At the same time, it must be admitted that eradication at the present time does not offer any immediate solution for controlling the disease as it occurs in other than self-contained herds. In this connection, I regard the newer knowledge regarding calfhood and heifer vaccination as of the utmost importance. Hitherto, many of us have been in the habit of thinking that there was really no difference at all between a natural and an artificial infection with *Br. abortus*, but I have quoted evidence to the effect that there is a very material difference. No doubt this is a variable quantity and dependent on the virulence of the vaccinal strain, but the evidence I have been able to collect indicates that the Ministry's vaccine is not particularly virulent for cattle. Dr. Andrews has already told us that the three vaccinal strains are of low pathogenicity for guinea-pigs. With a view to gathering evidence of the usefulness or otherwise of calfhood vaccination in the North of England, I put out the suggestion that this association should interest itself in procuring a definite trial. I think that such an experiment would appeal to farmers, and it would be in their interest to supply calves and in general to co-operate. I would be very pleased to carry out the necessary laboratory work.

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Discussion

Dr. Stableforth's Opening

Dr. A. W. Stableforth (London): I am glad to have the opportunity of contributing to the discussion on contagious abortion because it is a disease of the utmost importance to both veterinary surgeons and cattle owners, and is probably the cause of greater loss than any other cattle disease in this country, not excepting tuberculosis. There is, moreover, a strong difference of opinion regarding the value and ultimate effects of vaccination and the whole subject is one of much controversy.

Before discussing vaccination, however, I should like to say a few words regarding the actual eradication of the disease by the separation of reactors and non-reactors to the blood test.

I feel strongly that vaccination should not be used where it is at all possible to put into operation an eradication scheme. The eradication of contagious abortion from herds is nothing like so difficult as has often been thought in the past. At one time is was believed that the disease could not be eradicated unless two farms were available, one for reactors and one for non-reactors, or unless all reactors could be sold. It is now, however, generally agreed that it is possible to get rid of the disease where only one farm or set of premises is available, provided that the herd is reasonably self-contained and that it is possible to separate reactors and non-reactors when housed and at pasture.

I think we can go further, however, because there is ample evidence, both from the American side and from our own observations, that even when the herd is badly infected and the conditions far from ideal, *e.g.*, when only one main shed and one set of attendants are available, a great deal can be done to bring the disease under control, even if ultimate eradication takes longer. A herd can usually be put on a satisfactory breeding basis within 12 months. It is essential, however, that the herd be reasonably self-contained, that reactors and non-reactors should be strictly separated whilst at liberty on pastures or in yards, and that the owner should observe carefully the precautions laid down by his veterinary surgeon. These precautions are simple, not costly and not difficult to fit into the ordinary farm routine.

Nevertheless, whilst farmers whose herds are reasonably self-contained can with a little effort eradicate the disease, we have to bear in mind that some 60 per cent. of owners cannot embark on an eradication scheme but have to choose between letting the disease run its course or putting a vaccination programme into operation. Letting the disease run its course is a bad policy, because it is nothing more nor less than a haphazard and casual method of vaccination. When eradication is impossible it is better to vaccinate; it is something which can be done in a regular and orderly manner.

Some experiments on vaccination were carried out by Bang soon after his discovery of the organism responsible for the disease, but the first extensive controlled experiments were carried out by M'Fadyean and Stockman and published in 1914. They concluded that dead vaccine was of little or no value, but that vaccination with living culture produced a definite decrease in the percentage of abortions. The theory of live vaccination at that period might be said to be that an animal could be infected at a time, two months before service, when she was not susceptible to actual abortion, and that she would develop immunity before she was served and remain immune sufficiently long to tide her over the period of pregnancy. It was not then known how long she would remain infected or that carriers might be created.

As a result of these experiments vaccine was issued on a routine basis in this country, and also in other countries, and it was in 1928 to 1930 that we reached the peak of that kind of vaccination.

Whilst the use of living vaccine was spreading certain other facts were being discovered. Already in 1911 Schroeder and Cotton had shown that abortion organisms were excreted in the milk of infected animals; that was confirmed by Evans in 1915 and has since been further confirmed by various workers. There is no doubt at the present time that the udder is the seat where abortion organisms live between pregnancies. This fact became of increasing importance when it was shown by Evans in 1918 that the organism which caused abortion was very like that found in cases of undulant fever, and by Bevan in Rhodesia in 1921 that human beings could become infected with *Br. abortus* of bovine origin. From that time a large literature has developed, and has gone to show that milk contains large numbers of abortion organisms and that these are a potential source of danger to human beings. It has also become known that infected animals which do not abort, excrete infective organisms at the time of calving. During the period 1914 to 1930 the use of living vaccine became widespread and numerous reports of its value were published. [The speaker here summarised briefly the results of various workers.]

The general consensus of opinion was undoubtedly that vaccination with dead culture was of little or no value, but that vaccination with living culture was followed by a definite reduction in the number of abortions. Whilst, however, in some cases the reports deal with carefully controlled experiments where a sufficient number of unvaccinated cattle were left side by side with those vaccinated, other reports only give the percentage of abortions which occurred in the herds before and after vaccination. These figures are apt to be very misleading, because it is well known that after a storm of abortion there usually occurs a lull, whether vaccination has been carried out or not. That is a point which has always to be borne in mind. In contrast to this consensus of opinion in favour of vaccination there is, however, the work of Jensen (1931), who had published a detailed report of work carried out in Denmark from 1913 to 1917. In this experiment with living vaccine it was possible to control the results with an equal number of unvaccinated animals of the same age, kept under the same conditions. Only unserved heifers were used, on farms which were heavily infected. Of 447 vaccinated heifers 23·7 per cent. aborted, whilst of 424 unvaccinated heifers 38·8 per cent. aborted. The results in the various herds and in successive years varied greatly, and in certain herds the abortion rate was actually higher amongst the vaccinated than among the unvaccinated. Jensen's figures which were obtained in controlled experiments are such as to make one strongly doubt whether live vaccine is all that it is often claimed to be. It seems, therefore, that, generally speaking, vaccination with living culture does reduce the percentage of abortions, often strikingly, but that it has to be admitted that certain workers have found it useless and that the results have varied greatly from herd to herd in different countries, and in successive years, even in the same herd.

Other points of controversy regarding the use of living vaccines are whether it produces permanent agglutination reactors and carriers and, therefore, what effect it has on the incidence of the disease in future years and, also, whether it causes sterility.

There is no reason to doubt that virulent living vaccines do produce carriers. It is true that the amount of incontrovertible direct evidence is not large, but it is supported by considerable evidence of an indirect nature. In the first place, inoculation of a virulent vaccine produces an actual infection and might be expected to produce carriers in the same way as is done by natural infection. One difficulty in assessing results is that vaccination has usually been carried out in an infected herd and it is, therefore, often impossible to distinguish an infection of the udder caused by vaccination from a natural infection. Heifers are, however, usually originally free from infection and kept away from the milking herd until they calve, and if abortion organisms are found in their milk soon after calving, it is probable that they are derived from vaccine and not from natural infection. In the same way, if in heifers a high agglutinin reaction follows vaccination and is still present a month or two after calving, it is probable that udder infection has occurred.

The observations of Caldwell, Parker and Medlar are of interest in this connection. They had a herd under observation for a period of 16 years. During the first seven years the herd was regularly vaccinated. The abortions decreased but the disease did not die out. Vaccination was stopped in 1926 and in 1929 a change was made to a regular eradication campaign. In that way these authors had the opportunity of following the agglutination reactions of heifers which had been vaccinated and those which had not. In 1927 14 vaccinated heifers which had matured in 1926 were tested; eleven had titres of 1/120 to over 1/16,000; the remaining three had a titre of 1/60. Thirteen had developed agglutinins within three months of vaccination. At the same time 19 unvaccinated heifers in the same herd were tested; three had a titre of 1/120 and four a titre of 1/60, while twelve were entirely negative. Moreover, there was not only

a strong contrast in the development of agglutinins but in their persistence; most of the vaccinated animals were still reacting two years later, and after five years five animals which remained were still reacting; whereas, amongst the unvaccinated animals, the few which had reacted soon ceased to do so and the non-reactors remained non-reactors. It seems that vaccination must have played a big part in the difference between these groups. These observers also give examples of the great danger of introducing unvaccinated animals into a vaccinated herd, citing one instance where, whilst only one out of 21 aborted in the year of purchase, 18 out of 47 unvaccinated animals aborted the year following purchase.

Hadley and Welsh (1921), Buck and Creech (1924), and Hart, Hadley and Humphrey (1932) have also reported on the prompt appearance of agglutinins after vaccination, though they also found that they soon decreased. Mr. Stewart in his paper has also referred to the rapid disappearance of agglutinins after vaccination in two herds, and the fact that in those herds where living vaccine had been regularly carried out the percentage of reactors was low. It is evident that permanent infection has not been a common sequel in these herds, suggesting that the vaccine was probably of low virulence. My own findings in a few animals which I have tested are rather in contrast to Mr. Stewart's. In one herd, of four heifers which were tested three years after vaccination, one reacted at 1/80 and two at 1/20, whilst of ten animals which were tested two years after vaccination, eight were positive at from 1/40 to 1/160, one had a titre of 1/20, and one was negative. In another vaccinated herd, the majority of the animals were still reacting twelve months after the last vaccination. Smith and Little (1923) and Lubbehusen, Fitch and Boyd (1926) also recorded the persistence of fairly high titres for three or four years. The persistence of a marked reaction is, of course, important not only because it is one indication that the animal is a permanent carrier but because it interferes with the application of the agglutination test should it be subsequently decided to institute an eradication programme based on blood testing.

The chief direct evidence that vaccination produces carriers has been supplied by Hart and Traum (1925) and Cotton (1934) and by Comminotti (1931). Hart and Traum in carefully planned experiments reported that out of 16 lactating cows which were vaccinated before service ten had become udder carriers, whilst Cotton also found a similar occurrence. Both workers reported, however, that unbred heifers which were vaccinated did not become carriers. Comminotti, on the other hand, vaccinated 20 non-reacting heifers with living vaccine twice six weeks before service and showed that over half were excreting *Br. abortus* from 15 months to two years after vaccination. The strains had, moreover, the characters of vaccine strains. In most of these cases no details are given of the virulence of the vaccinating strains. Norris (1934), however, reports that even with old avirulent strains udder infection may be produced.

The second point of controversy is whether the use of living vaccine leads to sterility, the suggestion being made because retained placenta and sterility are more common in abortion-infected than in non-infected herds. There is little definite evidence that this is the case, but in some experiments with a live vaccine carried out by Hart and Carpenter (1923) nine out of 30 vaccinated heifers failed to conceive for at least a year after vaccination, whereas unvaccinated heifers kept under otherwise similar conditions bred normally. No explanation could be offered except the vaccination.

It seems that, although the value of vaccination with living culture is extraordinarily difficult to measure and the evidence conflicting, the weight of evidence supports the view that when given to cows it definitely decreases the abortion rate, but is likely to create permanent carriers, whilst when given to heifers two months before service it is less liable to create carriers, but is on the whole less effective in affording protection against abortion. The main causes of the conflict of evidence are probably, firstly, the variable virulence of the vaccination strain and, secondly, the difference of virulence in the strains present in the herds which are vaccinated. It is not yet exactly known what factors decide whether a strain will confer immunity, but virulence is probably one of the more important factors. In field work there is also, of course, the impossibility of predicting what will be the abortion rate in a given herd and year where no vaccine is used—so many factors are inter-connected. Few of the more comprehensive reports on vaccination give any indication regarding the virulence of the strain used.

There is also another method of vaccination, calfhood vaccination. Here again the evidence collected so far is not in agreement. The first experiments were carried out by Buck (1930) and further experiments have been reported by Cotton and Buck (1934). To these Mr. Stewart has referred in detail. In Cotton and Buck's experiments vaccination during calfhood usually produced only a temporary blood reaction, but when the animals were bred about one-and-a-half years later, 16 out of 17 vaccinated animals resisted an infection which was followed by abortion in nine out of 16 controls, from ten of which *Br. abortus* was also isolated from the genital tract in colostrum. Delez, however (1934) did not obtain such successful results. Six out of nine

animals which were vaccinated as calves and exposed when pregnant became infected and were proved to be infected and carriers; one of these aborted and one had a dead calf.

The protective value of vaccination of calves deserves to be further studied because, judging from the rapid disappearance of reactors, it seems rare for vaccine, even if from a virulent strain, to persist long.

Cotton and Buck found, moreover, that the immunity which they obtained appeared to be lasting; animals vaccinated in calfhood carried their calves to full time during two or three pregnancies, and although this may have been partly due to the exposures given, it suggests that calfhood vaccination may be a valuable preliminary method of dealing with the disease in herds in which eradication is at the moment impracticable. The spread and extent of the infection could be reduced, and no obstacle put in the way of the subsequent use of the blood test for eradication purposes.

That brings us to the questions that I think are uppermost in Mr. Stewart's mind; whether it is possible to get an abortion vaccine of such virulence that it will give satisfactory results in protecting against natural infection and at the same time not produce persistent marked blood reaction, *i.e.*, produce carriers; and also, what is the connection between the agglutination response and immunity.

A persistent strong blood reaction, a high agglutination titre, points to the probability that the animal is a carrier and would spread the disease, and a vaccine which produced these persistent strong reactions is not satisfactory for vaccination purposes. In the past vaccination has in most cases been made with strains of high or unknown virulence. Huddleson (1920 and 1924) was the first to report the isolation of a strain of low virulence and to explore the possibility of using such a strain for vaccination. In 1929 Giltner and Huddleson reported on the use of vaccines made from Huddleson's strain in 23 herds, full records being obtained in ten herds. The results were encouraging, particularly in the earlier years of their use, but no definite conclusion was reached, and I am not aware of any further publication. If avirulent strains or strains of low virulence produce reasonably efficient protection, their use would be obviously preferable to that of more virulent strains because they could be used on all non-pregnant animals, or possibly even during the early stages of pregnancy, and would not be likely to localise in the udder and produce carriers.

Cotton and Buck (1934) have also investigated the immunising power of strains of diverse degrees of virulence. In their earlier work (1932 and 1933) they found that the most promising results were obtained with strains so low in virulence as only occasionally to cause lesions when injected subcutaneously into guinea-pigs. These appeared to induce a distinct immunity in calves, virgin heifers and open cows and were at the same time practically devoid of the objectionable features of strains of high virulence. The use of virulent strains, on the other hand, was followed by excretion of *Br. abortus* with milk of cows, whilst avirulent strains had little immunising power. Cotton, Buck and Smith (1934) have just published some further experiments which are of particular interest. In the first series they compared as vaccines two avirulent strains and two strains of low virulence, 17 heifer calves being vaccinated in all. Each vaccine was also injected into twelve guinea-pigs and the virulence and agglutinin-producing power noted. Whereas the vaccine of low virulence produced slight lesions in guinea-pigs and marked and persistent agglutinin response in both guinea-pigs and calves, the avirulent vaccine produced no lesions in guinea-pigs and a much less marked agglutinin response, a titre about a quarter to a half as high in guinea-pigs and about a fifth as high in calves; moreover, it declined much more rapidly. When three months pregnant, five months after vaccination, the heifers were subjected to a severe test exposure, one which caused all of eight control heifers to abort, both vaccines gave considerable protection; *Br. abortus* was, however, isolated from three out of nine animals which had had the vaccine of low virulence, and from five out of eight of the heifers which had had the avirulent vaccine; the vaccine which gave the lower agglutinin response was less efficient than the one which gave the higher agglutinin response.

In the second experiment of the series the best avirulent strain, the best of the strains of low virulence, and a virulent strain were used. In this experiment the test exposure to infection was less severe, only seven out of eleven controls aborting or showing evidence of infection after calving. In the result, the virulent vaccine and the vaccine made with the strain of low virulence gave nearly complete protection, but the vaccine made with the avirulent strain gave no evidence of protection whatever; in fact, over 80 per cent. of heifers vaccinated with it became infected with abortion in spite of it, whereas only some 60 per cent. of controls became infected. A point to be noted is that this strain was the same as had apparently given a moderate degree of protection 21 months before; then it had also had a certain agglutinin producing power, whilst at the time of the second experiment it had practically none, *i.e.*, the better vaccine strain produced the more definite agglutinin titres. Probably the value of a strain for vaccination is closely connected with its power to produce definite agglutination titres, because that is con-

nected with virulence. If a vaccine is to produce immunity it has to be very near the point when it can produce permanent infection in cows, and possibly in heifers, if not in calves. It appears likely that the difference between a strain which will protect but may produce carriers and one which will not produce carriers but affords no protection, is a small one. In other words, when the virulence of a strain has been so far reduced that it is free from undesirable features, it needs but little further reduction to render it useless as an immunising agent.

If that is so, then it is useless to hope that we shall get a vaccine strain which will remain effective, but which has not some of the drawbacks in regard to the production of permanent infection and high agglutination titres.*

The question of a satisfactory vaccine is being actively investigated by the Abortion Committee of the Agricultural Research Council at the present time and we must await results.

Meanwhile, I agree with Mr. Stewart that calfhood vaccination seems likely to be a fruitful subject for investigation. Even when strains of moderate virulence are used, permanent infection may not result and yet something appears to be left which protects the animal against subsequent infection.

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* It is possible under experimental conditions to get a strain of exactly the right degree of virulence, but it is doubtful whether under conditions of commercial vaccine preparation this would be preserved.

Mr. F. Pickering, who followed, said he was sure they were all grateful to Mr. Lyle Stewart for bringing such an interesting and controversial subject up for discussion at that meeting and also to Dr. Stableforth for coming such a long distance to open the discussion.

Although Mr. Lyle Stewart was such a strong advocate for blood testing, he had very generously exposed all its weak points. As an equally strong advocate of inoculation with abortion vaccine A, he could say, in the parlance of the solicitors, "there is no case to answer"—the essayist had proved himself guilty. Mr. Lyle Stewart styled his paper "Control of Contagious Abortion," but there was only control as regards the individual herd being tested and that only when the reactors were segregated and kept away until they became non-reactors, died out, or were cast for slaughter. Any method of selling out reactors, or as Mr. Stewart suggested, buying in new cows subject to a test and returning them to their previous owners, or selling them in the event of their being reactors, led nowhere as regards eradication of abortion from the country. It was but exchanging owners to the benefit of one man only; the animals were still at large.

With regard to blood testing, his first experience in a large herd was not a happy one. It occurred about nine years ago. The reactors were sent away to new pastures and two abortions took place within about a fortnight. In another herd two well-known authorities differed as to the presence of abortion after blood testing. As a diagnostic, to prove the presence or otherwise of abortion in a herd, it was all right, and the Ministry demanded it before issuing the live vaccine. A weak point about the test was that sometimes one could not be sure of a definite result until nearly a month had elapsed after an abortion. He had a case in mind where a test was made of a herd of 32 cows and the two recent aborters did not react—one of them had just calved and from the appearance of the discharges it was apparent that the cow had contagious abortion. If a definite decision could not be obtained until a month after parturition whether a cow had aborted, or gone her full time (he thought it would be acknowledged that a cow could go her full term and still be a carrier) would there not always be danger in bringing any cow or heifer, tested or not, into a clean herd?

It might even happen that one of the owner's own cows might have caught a recent infection. One might have those animals calve on the premises (with all the mess it would entail), only to find out a month afterwards that the cow had contagious abortion—the discharges would be infective whether the cow had reacted or not.

Was the property which caused agglutination an antibody which would immunise the animal against a further abortion? If so, why cast the cow from the herd? She was salted, as they said in the colonies. Or was it something which denoted the active presence of *Brucella abortus* in the system or in the milk? If so, should such a cow be sold to anyone unless the buyer already had the disease on his premises? There was a temptation to a farmer to take that cow so long as he considered her cheap. He knew of a case where two cows were sold out of a herd as reactors; he admitted that the farmer had a previous aborter or two, but none very near this time. Shortly afterwards he sold all his cows at his farm sale and some of them went to another herd and commenced to abort—the first case on these premises. Sixty cases of abortion occurred in the course of a year or two. He did not think for one moment that those two

reactors were the cause of all the trouble, but if the last owner had known the whole history of the case, as he (the speaker) did, he would not have been suited—he even might have believed that he had a suit against someone. He was not condemning any man for clearing out all reactors from his herd; so long as the law allowed it, he had a perfect right to go on, and let someone else "nurse the baby." What he would like to insist upon was that the country would never be cleaned up by that system. It might create a few clean herds amongst the wealthy people, but no ordinary farmer could effectually carry it out and also it was not like clearing out a tuberculin tested herd, where the infection was slow; just a little infection into a herd which had lost its immunity and off it went once more.

As an interesting example of the danger of destroying those properties in the blood of a heavily infected herd, he might mention an experiment which his son, G. F. Pickering, carried out by injecting a solution of acriflavine intravenously—he had heard of its being carried out in America, the speaker believed. Almost all of the herd of twenty cows were reactors. He injected them every fortnight until there were no reactors. By the time the last cow had ceased to react the first ones commenced to abort, and the others continued doing so until things were as bad as before and they were still non-reactors. Did he kill some other immunity agent as well as the agglutination property? Or were they one and the same thing?

As to inoculation with abortion vaccine A: since it was first sent out by Stockman, about sixteen or seventeen years ago, he had used it extensively and he had such faith in it that he would like to be a Dictator for just two years—he should compel everyone who bred cattle to inoculate all non-pregnant cows and heifers for two seasons. He had no abortion among his cows, but he should be pleased to be the first to commence. He was not likely to get the Dictatorship, therefore he hoped the Ministry would see their way to bring in a compulsory Bill to compel all who had abortion on their premises to vaccinate. One of the strongest objections stated to live inoculation was that it caused sterility. Did it really do so? In his opinion, sterility was often the forerunner of abortion. So-called sterility was in a good many cases early abortion, the fœtus being cast at three to six weeks—"casting her bulling," as the farmer termed it. A year or two after the vaccine first came out a farmer had his cows vaccinated but would not have the heifers done because he had heard they might not hold. Four of the six heifers left undone never had a calf. In July, 1932, another client got two of several aborters tested with a positive result; he was going to inoculate but reconsidered the matter and changed his mind, because they might not hold: how difficult it was to destroy a fallacy once it secured a footing. On March 8th this year he was at his farm and asked him how he had fared; the farmer showed him eight good cows which he could not get in calf. He agreed to have them done and the speaker saw him on September 14th when he informed him that seven of them were safely in calf. No syringing or disinfectants were used.

No doubt vaccination with the live germ was not a perfect system, but it was by far the best offered up to date. Stockman had said there might be five per cent. failures owing to the idiosyncrasy of certain animals; probably there were more; he had done 60 and 70 during different years for one man and without a failure, and perhaps done seven for another man and had two abortions, but this was very rare.

It was often said that there was no necessity to vaccinate an animal that had aborted. He did not think that was a fact—cows often aborted twice. He asked Sir Stewart Stockman if it was necessary to vaccinate an aborter, the reply being that he would leave that to the discretion of the veterinary surgeon; he thought it might reinforce it, as it were, and might prove to be "the method of all methods"—those were his very words and he believed they represented the facts of the case. One could go on relating experiences that had occurred all through those last 17 years, of how the odd cow, to save expense, had not been vaccinated and had been the only one to abort. Surely the experience of the man who was constantly in touch with this matter in the field was at least as valuable as the experience of the scientist who was always quoting from books. He had inoculated 681 cows between August, 1933, and August, 1934; that was certainly by far the largest number he had ever done, but it showed that someone had faith in it, because it was not by any means by his own persuasion that he was doing so many—one neighbour told another. Someone might say that that was a proof of its inefficacy, but it was not so; those inoculations were made for the most part on premises where abortion existed 8, 10, or 16 years ago, or on new premises. Mr. Stewart's list No. 2 was very enlightening; it proved that the live vaccine, although preventative, did not make the heifers reactors. He intended sending 16 samples of blood from other vaccinated in-calf heifers, but the farmer got busy with the hay and Mr. Stewart went away for his holidays. It would have been interesting to have had those, because they had been kept out of an infective area until a month ago.

In conclusion, he should advise anyone who wanted to read a really practical paper in defence of inoculating with vaccine A to study Mr. G. P. Male's article in *The Veterinary Record* of January, 1933; there were only one or two minor points where he (Mr. Pickering) did not agree with him.

Mr. C. G. Hill mentioned a herd where there had been 75 per cent. abortions. He subjected the cows to vaccination with live organisms, carrying this out until all had been vaccinated. He continued this treatment for three years. That farmer had not now a single case of abortion since the vaccination with live organisms was begun, until two years ago, when abortions were taking place much too frequently. He sent up some blood to be examined, and it came back negative. At present (continued Mr. Hill) they were doing a large number of injections with live vaccines, and he bore out what Mr. Pickering had said. Personally, he did not think it was really the right method, but until they could get something better he should just carry on. Of course, he was going back 20 years or so, but he might say that in another farm where a herd was started, with proper treatment it was kept clear of abortion. The herd was self-contained. Where a farmer was continually buying in cows, he admitted he would be in difficulty.

Mr. T. M. Mitchell thought, in view of what he had heard from Mr. Stewart and Dr. Stableforth, that where animals were inoculated with live vaccines they would become infected and remain as carriers. Mr. Mitchell proceeded to make humorous reference to Mr. Pickering as dictator and his responsibility for the tremendous amount of abortion that obtained in his district. Referring to experiences with abortion, this

speaker stated that he had an inoculated herd under observation for one year. The cows were treated two months before they were served. The result was that the percentage of abortions to those that calved was about equal. A separate byre was used which was like a little hospital. Mr. Mitchell also referred to an instance in which abortion in the cows amounted to 75 per cent.; that was, only 25 per cent. of live calves came out of the herd in question. As an experiment 20 maiden heifers ready for the bull were inoculated with the Ministry's live vaccine. Out of that number six aborted between five and eight months, whilst four were unable to get a calf at all, so that there were only ten with live calves. After an experience like that he did not think they would criticise him for giving up the idea of using live vaccines. Since then he had depended upon dead vaccines.

Mr. L. E. Perkins said he agreed with Mr. Pickering when he deplored the amount of attention that was being paid to milk infection by public authorities in recent years; it was a shame that so much importance was being given to that aspect of the case. According to Mr. Stewart's paper, between 30 and 40 per cent. of cows were reactors; therefore one might assume that at least 25 per cent. were infected with *Br. abortus*. Yet the essayist had stated, a little later, that up to 1933 less than 200 definite cases of human infection had been reported in Great Britain. It was known that the human being was more susceptible to the porcine strain of abortion; was it not possible that in the cases referred to the infection was with the porcine strain, which had passed through bovine sources? As to the agglutination test, Mr. Perkins thought that Mr. Stewart should take as a positive titre one slightly less than 1: 40; say, 1: 25. Mr. Mitchell had referred to some unsatisfactory results with live vaccines. Was it not possible that he was using a strain of vaccines of very low virulence against a very strong virulence of infection? One method was to get vaccines made from organisms on the premises at the time.

Mr. Mitchell: "I admit that; but how was I to know?"

Mr. Perkins went on to refer to the agglutination titre and asked if it were not possible that the natural immunity of an animal might depend on some other body besides that responsible for agglutination? Again, if one stated that the agglutination titre was a measure of the amount of active infection present in an animal, how could one explain cases of animals which at the time of abortion, when one would imagine the disease to be most active, gave negative results, and yet in a period of three or four weeks one might get a very high agglutination titre? Apparently in these cases agglutination did not give any indication of infection which was present in an animal. Concerning the question of vaccination, it was generally regarded that the introduction of a disease by the unnatural method did not give the same results as with the natural method of infection.

Mr. T. Wilkinson commented that after hearing the different views one hardly knew where one stood. He thought that if inoculation was done properly it would be a big step towards eradicating the disease. He wondered whether, if heifers did not react, they would breed the disease; also, if heifer calves happened to be reared on aborted cows, what would be the effect later in life.

Mr. C. Nicholson said a lot of good could be done if the byres were brought more up-to-date; that was more dependent on the landlords. He agreed with Mr. Pickering about the live vaccine.

Mr. W. Jackson Young said that Mr. Stewart had compiled an excellent summary, considering the amount of literature that existed on the subject of abortion. He was also grateful to the essayist for drawing their attention to the table on the board regarding losses in lactation yields due to the disease. A companion table, showing the analyses of the milk, would be interesting. He himself worked that out some years ago in connection with some legal proceedings against a man for selling milk deficient in fat; and with the aid of the analyst they proved that the abortion disease had no effect on the chemical composition of the milk, and that the existence of abortion in the herd was no offence under the Food and Drugs Act. He was in full agreement with Mr. Stewart in his remarks about graded milk being kept free from pathogenic organisms. It was for the Ministry of Health to see that these specially designated milks were absolutely free of pathogenic organisms. They in the veterinary profession were quite prepared and willing to help Government Departments in their efforts to secure a pure milk supply and it was regrettable that there was not more coördination between authorities. Dr. Stableforth had come to give them the benefit of his great experience as a laboratory worker, and he had given an outline of his work with practitioners and in vaccination. They were grateful to him. He complimented Dr. Stableforth on his remarks and also on his very informative article in the August issue of the *Veterinary Journal*, which he would commend all of them to read. It was Mr. Young's privilege quite recently to hear abortion discussed in New York. He was present at the formal and informal discussions on abortion and other diseases, about some of which he had never heard anything. He listened attentively, but the difficult thing out there was for a Britisher to "get a word in edgeways." It was held that, in regard to vaccination strains of low virulence, such were ideal for vaccinating animals.

He had little to add to the discussion, because what had been said and written about abortion made it difficult to find out anything new. It was refreshing to hear the divergent views expressed; there was room for differences of opinion. It seemed to him that they, as veterinary surgeons, should be able to interpret the findings of the scientists clearly when they spoke to stock owners. Personally, he aimed at giving popular talks to the stock owners on abortion and other ailments. If he began to speak to them of agglutination titre and other technical terms he was sure there would be a shuffling of feet, and he thought they should come down to the chief features of the matter. Mr. Stewart had summarised the main methods of dealing with the disease in the closing sentences of his paper, and he found himself nearly in full agreement with him. He would prefer the calving cows to be retained in the maternity sheds or boxes for a period of at least one month and until all dangers had ceased. As to disinfectants, he would be glad to know what were the views of Mr. Stewart and Dr. Stableforth concerning the best disinfectants to use. Personally, he made much use of copper sulphate in proper proportions, and recently he had also advocated the use of carbonate of soda.

Mr. H. S. Elphick expressed the opinion that the use of the dead vaccine in the treatment of this disease was of no value.

The President (Mr. A. C. Forbes) said that he had tried both dead and live vaccines. In every case where he tried live vaccine the cow carried the calf the full time; but the disease was not entirely eradicated from the herd in question.

The Replies

Mr. Lyle Stewart, in reply, said that the variation in the opinions expressed only showed how far we had yet to advance in fundamental knowledge about this important disease. With regard to Mr. Pickering's views, that gentlemen had a wide practice and lived in a very important cattle breeding area, but he (Mr. Stewart) did not think that Mr. Pickering would guarantee that he was able to follow up the future career of even a small proportion of vaccinated animals which were constantly migrating out of the Hexham area. Dr. Stableforth and himself were in the main in agreement. "No Immunity without Infection" appeared to be the recognised slogan. It had been felt by some people that when one resorted to the use of living vaccines, there was a danger of infecting all the animals, but Mr. Pickering and he could point to definite cases where living vaccines had been in use for a number of years, and instead of increasing the number of infected animals, they had actually decreased the number almost to vanishing point. There were still doubts about the agglutination test and its relation to immunity, and as to the existence of the latter there still appeared to be much uncertainty. Dr. Stableforth had agreed, however, that with regard to living abortus vaccine there was some evidence in this country that on practical grounds it was of value in decreasing abortions. We did know that there was a great difference in the virulence of the abortus strains, apart altogether from the porcine strains, and that was how, in all probability, Mr. Mitchell's experiences could be explained. That went to the root of the whole question, and showed, in Mr. Mitchell's case, where vaccines appeared to have no result. If the Ministry were questioned closely about the virulence of the vaccine strains, perhaps they would not be able to be very definite about virulence. Mr. Lyle Stewart was hoping that Dr. Stableforth would have given them a more emphatic lead and tell them what to do in combating the disease. He (Mr. Stewart) had expected an onslaught from Mr. Pickering, and he was not disappointed. They could not go against the experience of the practical men in the field; and he felt there was a stratum of truth in what Mr. Pickering had told them. As to the use of dyes in overcoming the infection, aniline dyes had been tried in Germany, but the results had been negative. In reply to Mr. Mitchell, until they got a better grasp of the fundamentals or of the theory of the agglutination test and of vaccine therapy they would not be in a proper position to give definite advice as to the ideal way of controlling this disease. As to disinfectants, their value should be measured by their capacity to destroy *Br. abortus*. Foot-and-mouth disease control methods were not necessarily the best to use against abortion, and each disinfectant should be tested against the specific organism one wished to destroy.

Dr. Stableforth, referring to methods of infection, quoted recent experiments which showed that infection could be transmitted *via* the conjunctiva by surprisingly small doses and that it could also get in through the unbroken skin. This did not alter the methods of control based on blood tests, but emphasised the necessity that every care be exercised in order to keep non-reactors away from the danger of infection. Mr. Stewart had taken him to task because he had not given a definite lead. The best thing to do was to work for eradication of the disease from a herd, if that were at all possible. If that were not possible, then the next best thing was to vaccinate the animals. What vaccine to use was the moot point; that was under experiment in America and also in this country at the moment. What was wanted was a vaccine that would give protection but would not produce permanent infection. Whether that were possible, no one could say at the moment.

Equine Genetics 275 Years Ago

(Extracts from "The History of Four-Footed Beasts and Serpents" by E. Topsel. *Circa* 1658 A.D.)

It is interesting to know that the services of a stallion were not always regarded as necessary for the production of foals. Mr. Topsel relates that: "In Spain, in the Mountain Tegro, there be Mares which rage so far in lust, that by their ardent desire of copulation they conceive by the Southwest winde, without the company of a Horse. And it is the property of these Mares by kicking against the winde with their hinder legs, to open their own womb, and to receive in that delectable air, wherewithal they are satisfied." The mares "in the Isle of Pealtupha" used to behave in the same way, using the west wind. I give the localities in case someone would like to make investigations; unfortunately the accomplishment is of little practical use because "those Foales live not till they be above three year old" (a rather ambiguous statement).

Animal psychology was not left out of account. For instance, here is the way to get a foal coloured and marked as you wish. "Horsekeepers have devised to make their Mares conceive strange colours, for when the Mares would go to the Horse, they paint a Stallion with divers colours, and so bring him into the sight and presence of the Mare; where they suffer him to stand a good while, until she perfectly conceive in her imagination the true Idea and full impression of those pictures, and then they suffer him to cover her; which being performed, she conceiveth a Foal of those colours."

Here is another example. "Horses are naturally proud of these locks (forelock—O.G.) and manes, as may appear by those Mares which are kept for procreation of Mules, by copulation with Asses, which at first despise to engender with those short-haired and shaveling Stallions. Wherefore the keepers shave off their manes, and their fore-tops, afterwards leading them to the waters, wherein while the Mares behold their own deformity, they grow so shamed, dejected, and discouraged, that ever after they admit with quietness the Asses to cover them."

Sex determination is really quite simple. "It is in our power to cause our Horses to bring forth males or females; for if we suffer them to couple when the North winde bloweth, or the third day before the full moon, or bind his left stone, he shall get a male; but if when the South winde bloweth, or three days after the full moon,

or bind the right stone of the Horse, it will prove a female. Also if at the time of copulation, the Horse leap off from the Mare on the right side, it is a token it will be a male, but if on the left side, it will be a female." One is not told the result of the horse dismounting directly behind the mare. There is no suggestion that the mare determines the sex, an idea I have frequently met with recently.

To cure barrenness is not difficult, though the last medicine may be troublesome to procure. "A barren Mare shall conceive if you take a bunch of leeks bruised small and put into a cup of Wine and twelve French flies called Cantharides in water, put them two days together into the Genital of a Mare, like a Glyster, and afterwards put her to a Horse, anointing her secrets with the said ointment two several times, when the Horse leaps down from her; or else they take Niter, Sparrows' dung, Rozen, and Turpentine, thrusting the same into the Mare's genital, whereby it hath been proved that fecundity oftentimes followed. Also some use Siler of the Mountains to procure conception."

Having got your mare pregnant, it is advisable to take precautions against abortion. "This is most certain, that if a Woman in her Flowers touch a Mare with foal (or sometime do but see her) it causeth to cast her foal, if that purgation be the first after her Virginity." I am unable to suggest a tactful way of guarding against the above risk. It continues, "In like manner, if they smell of the snuffe of a Candle, or eat Buckmast or Gentian, if a Mare kick at a Wolf, or tread where a Wolf hath troad, she casteth her foale."

The authority for the following extract is given as being Aristotle. Speaking seriously, it would be interesting to know whether the average duration of pregnancy has in fact decreased some twenty days during the period of some 2,300 years. "They carry their young one in their wombs twelve months, but sometimes they come at eleven months and ten dayes, and those are commonly males, for the males are sooner perfected in the womb than the females, and commonly the females are foaled at twelve months and ten days, and those which tarry longer are unprofitable and not worth education."

O. Greig.

Lady Coates, in her capacity as President, made a broadcast appeal from the Belfast radio station recently, on behalf of the Veterinary Hospital at "Edenmore," Whiteabbey, County Antrim, and the Animals' Shelter and Dispensary at Hamilton Street, Belfast, both of which are under the management of the Ulster Society for the Prevention of Cruelty to Animals, and are professionally staffed.

Clinical Communication

SOME OBSERVATIONS ON COLIC IN ADULT CART-HORSES DUE TO THE LARVÆ OF *STRONGYLUS VULGARIS**

A. W. NOEL PILLERS, F.R.C.V.S., D.V.S.M., F.R.S.E.

When I received from your Secretary, early in 1933, the invitation to read a paper before your Association, I cast about for a subject which would be interesting to you and which at the same time had special appeal to myself. In the end I decided upon the present title out of courtesy to one of your members—Caulton Reeks—one who has done more for the clinical aspect of colic than the rest of the profession together. I well remember the days of sedatives and the changes wrought by the first edition of Reeks' book. I have enjoyed successive editions, especially the last. This paper, however, is a plea for the insertion of the particular colic I am about to describe in the very first flight of common colics, despite the fact that Reeks does not deal with it as a distinct condition. I recognise, however, that it is difficult to deal under one heading with the various pictures due to this cause. It is true that on p. 13 he mentions "the colic produced by worms" and on p. 64 under other and various exciting causes, he says:—

> "Aneurysm of the anterior mesenteric artery, due to the presence of strongyles, frequently determines the impaction of fæces, owing to the interference with the blood supply to the cæcum and colon. Pieces of the thrombus break off and effectually plug smaller arteries supplying mainly parts of the cæcum and colon. In the anæmic area of bowel thus produced, peristalsis is diminished or perhaps altogether in abeyance. As a consequence we get great weakness, or even paralysis of that portion of bowel with a tendency to stasis of its contents and obstruction from fæcal accumulations."

On p. 67 he lists bots and strongyles as causing some breach in the intestinal walls and on p. 69 we see as causes "the presence of parasites either in the stomach or in the intestines." There is a further reference to aneurysm on p. 115. All this is brushed aside by "with the forms of colic so caused this book will not deal as separate entities." In reality then, he flirts with the subject of parasites in several places and drops them to court other hypotheses less satisfying to the sceptical mind.

Elsewhere I have alluded to the great scourges of town cart-horses as I see them, *viz.*, itchy

* Made to the Lincolnshire Division, N.V.M.A., at Lincoln, October 10th, 1934.

legs,[1] paradontal disease[2] and nasal catarrh.[3] Strongylidosis is the greatest of them all and would require a volume for adequate treatment. I want to emphasise most strongly that this paper deals only with one aspect of one species of worm, that there are many other aspects of this worm and some 40 other species with many different pictures. In order that I may create a suitable atmosphere of scepticism concerning some the mechanical and dietetic views on the causes of colic, I should like to put the following few questions before you.

(i) Why is it that although Ruysch discovered worms in aneurysms so long ago as 1665, this origin of colic has never been a popular topic in England, when it seems to receive full recognition in several other countries?

(ii) How often have many of us made *post-mortem* examinations (or ought I to have said half-made) and having found an abrupt termination or terminations to an area of intense haemorrhagic coloration of the intestines, have diagnosed a twist of the bowels which has miraculously come undone since death?

(iii) What is the cause of odd colic cases in stables where food and feeding, water and watering, work and management, are all that man considers desirable and where causes, as given in Reeks' book, appear to be absent?

(iv) How is it that a group of eight or ten cart-horses can eat large quantities of mouldy oat straw and "charlock" for several days without injurious effect, when such a diet is freely stated to be such a potent producer of colic?

(v) Apart from calculus, the incarcerations (diaphragm, foramen of Winslow, mesentery and omentum) and ruptures (diaphragm, stomach and bowel), how often is the real cause of a death from colic discovered?

(vi) Why, when having found a twist, volvulus, intussusception or impaction on *post-mortem* examination, do we stop our examination instead of realising that such a discovery is the commencement of our task?

(vii) How is it that where anthelmintic treatment has been carried out extensively as a routine measure, especially when intravenous medication has been employed, colic has been greatly reduced?

(viii) What is likely to be the actual etiological factor in the case of a cart-horse which has had colic ten times and recovered and dies of twist on the eleventh occasion?

There are other just as pertinent questions, all of which I feel can be sympathetically treated if one fully realises the importance of the larvæ of *Strongylus vulgaris*. I now propose, therefore, to burden you with a few details of the worm, of the blood supply to the intestines and of the patho-physiology of the bowel, before returning to the clinical side of the subject.

The essential features of the adult worm are as follows: The male is about 15 mm. long and the female 22 mm. They live on the mucous membrane of the cæcum and colon where they attach themselves and suck blood. They are of dark slate colour. The eggs, which cannot be distinguished from those of many other equine strongyles, pass out in the faeces and the larvæ soon escape. After a sojourn in the outer world the infective larval stage is reached. It is an ensheathed larva, and possibly under the most favourable conditions can maintain its existence for about a year: under adverse conditions the period is certainly much less. Infective larvæ are taken in by way of the mouth in food and water. After losing their sheaths the larvæ penetrate into the wall of the intestine and migrate through the body. The exact route taken is not known. Many workers believe that it is the same as that taken by *Ascaris lumbricoides, i.e., via* the blood stream to the lungs and then up the trachea and down the œsophagus to the cæcum and double colon. If this view is accepted then the larvæ found in the deposit in the aneurysm of the anterior mesenteric artery have gone astray or have become side-tracked. In support of this view it has to be recalled that heavy infestations with adult *Strongylus vulgaris* are sometimes encountered when there are no lesions in the anterior mesenteric artery. The larvæ may attain a size almost as long as the respective adult male and female, and are undoubtedly too thick to pass the terminal arterioles of the various branches of the anterior mesenteric artery and so return to the bowel lumen. Their length of life and fate are unknown. Some authors regard the aneurysmal larvæ as a stage in the normal life cycle of the worm. It is difficult to imagine in a heavy intestinal infection, with few lesions in the artery, that all the larvæ have passed that way. It is held by some that the early larvæ penetrate the intestinal wall, that many enter vessels and are carried on their way, but that some go through the intestinal wall and are carried up between the folds of the mesentery until they meet the large blood vessels, the veins are easily entered, and the normal route is followed. The anterior mesenteric artery and later its blood flow afford, however, great resistance to penetration and prevent progress in the desired direction, so that the worms remain there and the aneurysm and clot are formed. All this goes to show that we still require a great deal of information before we can be satisfied.

Although it was as long ago as 1870 that O. Bollinger gave us what I consider the first full and clear account of aneurysmal colic, we still require to know many details of its causation.

In more recent years, Olt,[4] Mollmann[5] and others have attributed most importance to the damage of the cœliac and anterior mesenteric nerve plexuses as the larvæ enter the artery walls from without. The injury thus produced is said to bring about damage to the nerves favourable to impaction, twist, intussusception, etc. Although these views are put forward somewhat in opposition to those of Bollinger, it is interesting to note that he included very similar findings in one of his conclusions, thus:

> "Owing to the fibrous thickening of the connective tissue at the root of the anterior mesenteric, round the aneurysm, and to the considerable size of the latter, disturbances of innervation of the intestine (as well as) hindrances to the passage of the chyle, and irregularities in the portal circulation may be created, which may well lie at the root of many chronic disturbances of digestion in horses."

In my experience, many *post-mortem* examinations show blocked vessels, especially in recurrent cases of colic, and no matter which way the larvæ arrive within the aneurysm, the nerve plexuses are likely to be damaged as shown by Bollinger and more recent workers. Although aneurysms of worm origin occur in several branches of the abdominal aorta, they are only extremely common in the anterior or cranial mesenteric artery. Some authors report them in from 90 to 94 per cent. of animals examined. May I here remind you that this considerable vessel passes from the aorta just below the body of the first lumbar vertebra, at a point where the ileum ends, the cæcum starts, and the fourth portion of the double colon (right dorsal colon) turns into the floating colon. With the exception of a small portion at the beginning of the small intestine and the floating colon and rectum at the end, it supplies the whole bowel with blood. Soon after leaving the aorta it divides into three portions, *viz.*:—

A.—The left branch, which gives rise to 15 to 20 arteries supplying the small intestine, the first and last effecting anastomoses with adjacent vessels.

B.—The right branch (the ileo-cæco-colic artery), which is really a continuation of the trunk and is the common seat of aneurysm. It has four important tributaries:—

(i) The ileal artery, which anastomoses with the last branch of A.

(ii) The external or inferior cæcal artery.

(iii) The internal or superior cæcal artery.

(iv) The ventral, right, or direct colic artery, on the opposed surfaces of the first and second portions (right and left ventral) of the double colon, to the pelvic flexure, where it unites with the retrograde colic artery.

C.—The anterior branch with two important tributaries:—

(i) The dorsal, left, or retrograde colic artery, which travels along the fourth and third portions (right and left dorsal) of the double colon to join the direct colic artery at the pelvic flexure.

(ii) The middle colic, or first artery of the small colon, which anastomoses with an arch of the posterior mesenteric artery and sends a branch to join the dorsal colic artery.

This is, to my mind, a wonderful arrangement and must, many times in the life-time of a horse, prevent disaster overtaking the bowels. Cobbold[6] in his "Parasites," 1879, gives a translation of several conclusions from Bollinger's book. They are too lengthy to quote, and you know well enough what happens when a thrombus softens and portions are carried on as emboli.

A large number of the apparently accepted causes of colic have little appeal to me, especially when one sees them at work and nothing happens, and yet on the other hand, when they are absent cases of colic occur. Given a normal intestine, the horse can deal with many defects in foodstuffs and feeding provided they are not overpowering. It seems to me that the important intrinsic states which bring about colic can be grouped as follows:—

1. Alterations in the normal movements of the bowel: (*a*) paralysis, (*b*) atony, (*c*) spasm and (*d*) hyperperistalsis.

2. Alterations in the nature of the secretions: (*a*) increase, (*b*) decrease and (*c*) arrest.

3. Alterations in the function of the nerve supply to the intestines: (*a*) vagus and (*b*) autonomic.

What is there more capable of upsetting the movement and secretion of the bowel and of producing a state of irritability than the changes brought about in the bowel wall by the blockage of blood vessels with material from thrombi generated by the larvæ of *Strongylus vulgaris*? It is small wonder, therefore, that some enthusiasts have regarded this worm as the alpha and omega of equine colic.

The richness of the blood supply to the double colon is opposed to marked passive congestion, and the production of infarcts implies an absence of anastomoses of the obstructed vessel with a neighbouring one. These two pathological facts have caused supporters of the aneurysmal origin of colic some anxiety, but they point out that we have little or no experimental work to prove that they are actually true

in application to the horse's large bowel. The admitted damage to the nerve supply and the time taken to bring about a compensating circulation when even a single vessel is blocked, is sufficient to start a vicious circle of paralysis, impaction, and gas formation, the latter being the greatest factor in the production of pain.

It will not be expected that, in discussing a cause of colic, I should attribute a special set of signs or symptoms to it.

The post-mortem findings vary from hardly detectable change in very acute cases, to the fully developed picture of the average case. There may be marked hæmorrhagic infarction affecting the small intestine, cæcum or colon, and even the mesentery and omentum. Sometimes the changes are localised, at others whole organs are involved. The intestinal wall is dark red in colour and marbled; it may be several times thicker than normal and is easily broken. On section, the several layers are indistinct, with extensive serous infiltration and clot formation. Sero-sanguinolent fluid may be present in the adominal cavity and the bowel contents are blood-stained. It is nearly always difficult to discover the emboli which have actually caused the lesions, but sometimes when certain arteries of the right branch of the main artery have been blocked for some days, before a final extension has brought about death, the blockage is easily detected. It does not follow that because a horse with an aneurysm dies of colic this is a relation of cause and effect, although in my view it is very likely to be so. I shall be very satisfied with this talk if, as a result of it, a high percentage of my listeners will make it a rule to examine the anterior mesenteric artery and its branches closely at the *post-mortem* examination of their fatal colic cases. At present, this artery is often hacked through by the knacker man, and few of us ever see it again, let alone opening up important branches by means of a sharp, narrow, probe-pointed bistoury.

The Principles of Treatment must be (i) to lessen the blood supply in the affected area by increasing the amount elsewhere, (ii) to prevent the formation of intestinal gases, (iii) to empty the bowel of its load, (iv) to lessen pain without reducing the chances of recovery, and (v) to stimulate the muscles of the damaged bowel.

The complete control of this worm is possible to-day, but before this is brought into every-day use, we shall have to brighten up our ideas very considerably and completely alter the outlook of horse owners. We cannot diagnose the presence of larvæ in the anterior mesenteric artery or of the adults in the bowel, but this worm is so common that it is likely to be present when fæcal examination reveals an infestation of strongyles. There are to-day at our disposal some very good antheimintics; there are some useful methods of storing manure, and it is not difficult to graze ruminants or crop a piece of land for twelve months. I see no more difficulty in the way of producing a worm-free stud than in creating a tuberculosis-free herd. Just as the tuberculin test shows us the position in a herd, so will microscopic examination show up strongyle infestation. Such a step will often reveal a state of affairs far worse than one had imagined from observation alone.

References

[1]Veterinary Record, 1932, p. 969.
[2]Idem., 1933, p. 1404.
[3]Idem., 1934, p. 1153.
[4]Deutsch Tierärztl. Wochenschrift, 1932, p. 326.
[5]Zeitschrift für Vet.-kunde, 1932, p. 273.
[6]Parasites, 1879, pp. 269-373.

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Discussion

Mr. W. W. Lang, in opening the discussion, said (in the course of his remarks) that if any of them had any doubts of Captain Pillers' abilities as an astute observer and thinker—as a clinician of the first rank—those doubts would be dispelled once and for all when that most interesting and suggestive paper had been studied. Fortunate the man whose life's work was also his hobby.

Captain Pillers himself was well aware of the value of expressed appreciation, for he had paid a great and well-deserved compliment to their colleague, Mr. Caulton Reeks, by giving them that paper and by the remarks he had made.

He could only discuss the paper in a general way, because Captain Pillers had made out such a good case for his theories. He made them all wonder, with him, why more importance had not been attached to parasites in general and *Strongylus vulgaris* in particular, since the latter had for long been known for its association with verminous aneurysms. For his own part, he admitted the sin of omission because, to speak truly, he had never associated colics with parasites at all; hence his shortcomings. His ideas were concerned with toxæmias, and even now he was inclined to believe that, in North Lincolnshire at least, dietetic errors were very much to blame—for example, in cases of impacted colon—that they were contributory causes, at any rate, as the condition he had instanced was seasonal and associated with winter stabling and feeding. It must be admitted, however, that not all of the horses so wrongfully fed got impaction of the colon, the most common cause of the colics he saw. Why was it that their thoroughbreds and hunters were rarely affected and yet all of them were turned out to graze some time during each year? For one thing, they were fed in an entirely different manner.

When he was in India he got quite a good nodding acquaintance with intestinal parasites in the horse and was particularly struck with the fact, brought out during many *post-mortem* examinations, that the alimentary canal in the fat horse was seething with parasites of all kinds, whereas, in the debilitated animal, scarcely any would be found. So impressed was he that, after explaining his quandary, he asked Colonel Pease, then Principal of the Lahore Veterinary College, and Mr. Walter Taylor, now Principal: "Here, what harm do worms do?" They both laughed and the latter made the remark: "So you've got to that stage; that is what we have been wanting

to know for years." He had felt quite progressive then. On the other hand, they had all seen the spectacular results of strongylosis in calves (husk) and lambs, gapes in poultry, etc.

They all knew the thin horse which died of twist and the unfortunate debilitated animal which had repeated attacks of tympanitic colic and eventually succumbed. He made no apology for referring to common salt, for, with a dose or two, the great majority of both those types rapidly put on condition and were permanently benefited. He had vivid memories of a thin horse which had violent attacks of tympanitic colic twice or three times a week for two to three months on end and which, after three days' treatment with salt and formalin, became the fattest horse on the farm and did not have another attack until a year-and-a-half later. He had personally got miraculous results in many cases of debility and he had had many reports of similar successes—so wonderful as to be almost incredible. How many of such cases were due to parasitic infestation? We would unhesitatingly give an affirmative answer to the question: "Has salt treatment a salutary effect in the treatment of intestinal parasites?" A five per cent. solution would eliminate a large number of all kinds, some dead and some still alive, but he killed six of their hosts as well. It was only fair to say that those animals were in such an extreme state of debility that they were worthless, but he did not feel disposed to carry on with the five per cent. solution, reducing it to two-and-a-half per cent., which ensured safety. Even then it was quite common to find a large number of dead ascarides in the voided fæces after his colic treatment.

In India there was a condition known as bursattae, but according to Hutyra and Marek it was not clear whether it was due to a parasite or a fungus. Hard fibrous growths were formed, particularly near the commissure of the lips and in the vicinity of the eyelids, while later a number of calcareous deposits were found in the growths. He found that common salt and antimony tartrate together acted as a specific. The deposits, known as "kunkers," quickly sloughed out and complete early recovery took place, though he was unable to state whether there was any recurrence—of course re-infection was possible. Since his last time in the East he had been told that ol. chenopodii was also extremely useful.

In equine piroplasmosis—better known as biliary fever and due to a blood parasite—excellent results were also obtained from the salt and antimony tartrate treatment. He remembered twelve horses all coming into hospital within a few days; their temperatures, about 107°F., dropped to normal, their mucous membranes cleared within three days and the patients were all fit for work in four to six weeks. Treatment by any other method, so far as he knew, was followed, if successful, by prolonged debility even of a year's duration. (*Veterinary Record*, Vol. 31, November 9th, 1918. "Some Observations on Sodium Chloride"—W. W. Lang.)

He had mentioned those conditions because perusal of the paper had left him wondering whether, after all, he had not been entertaining an angel unawares.

Captain Pillers had very considerately given him an opening in his references to that condition which they knew as impacted cæcum and he was very much inclined to think that the essayist had supplied the key to the situation. Some of them might know that he claimed to have effected recovery in a large number of cases of the kind, which were quite common in the district in which he practised. He need not give any description of that condition, contenting himself with commending to enquiring minds the perusal of Caulton Reeks' "Common Colics" in which was to be found a wonderful pen picture under the title of "Subacute Obstruction of the Cæcum," pp. 260-277. For long it was a baffling affection to him, so much so that a lasting impression was made by the sentence: "It is not a pleasant ending this—a sudden and unexpectedly fatal one to a case the veterinarian at the outset deems simple." His treatment had been salt and formalin in large quantities of water and now he was exercised in his mind as to how his successful results had been obtained. Captain Pillers had pointed out that the ileo-cæcal-colic artery supplied the cæcum and adjacent parts of the bowel and, further, that this artery was the most common seat of parasitic aneurysm. It would appear that the cause of an impacted cæcum was now clear and that his successes might have been due to prolonged bathing of the parasites in the salt-charged blood; it might be, too, that the thrombi were to a certain extent dissolved. Injections of saturated salt solution would often dissipate swellings of long standing; or, if there were a centre of pus, bring about the formation of an enormous abscess—that was an excellent method of treating shoulder tumours, for which he was indebted to Angler. He might say that he had never known a recurrence of impacted cæcum and he had known several animals for years after. Recovery was spectacular; one found enormous quantities of fæces passed, in large lumps, bearing the impress of the bowel, but of normal consistency. The patient was bright, cheerful and drinking well—the clouds rolled away. Did all that indicate complete restoration of the blood supply?

He was eagerly looking forward to the time when their essayist would divulge the treatment which met all the postulates which he had enumerated. Might he there give a hint about the raising of the jugular vein? First, pass the stomach tube into the œsophagus and compress the vein against it; they would find it then possible to distend the vein considerably more than usual, with less risk of injury.

He had taken up a good deal of their time and, as he expected, and hoped, that other members had something of interest and value to add to the discussion, he would close his remarks by saying that he was grateful to Captain Pillers for his paper; he had given him a new interest in the work, a new path to explore. Unfortunately, knacker yards were not quite conveniently placed for him for the carrying out of *post-mortem* examinations, as he would wish to do and, more unfortunately still, it did not seem fitting that veterinary surgeons should own those—should he call them "adjuncts"—to their calling.

Mr. R. Hudson thanked Captain Pillers for a very interesting paper. In the first place he would ask what was the common cause of death in fatal colic cases—was it twist, or, as Captain Pillers said, embolism?

He remembered a case from his student days, one of excessive diarrhœa. The *post-mortem* showed thickening of the wall of the large colon, parts of which were submitted for pathological examination without any definite diagnosis being made. Would it have any connection with Strongylidosis?

Similar lesions might be caused by the plugging of the vessels to the colon by a thrombus. He felt sure, however, that the great majority

of "colics" were due, either to dietetic errors, or to work exhaustion; there might, however, be other predisposing causes. Again, there had been many changes in the type of colic encountered during the last few years. Twist was not nearly so common; in fact, with better feeding and a shorter working day, that might be said of all "colics." In its place he frequently met with a very fatal type of impaction at the ileo-cæcal valve, of which he had photographs, for their examination, secured at *post-mortems*.

If verminous colic was very prevalent he was sure that the changes he had mentioned would not have made such a vast difference in the type of colic with which they commonly met.

Mr. G. Lockwood said that he had not recognised a type of verminous colic in adult horses, and that he thought the great majority were due to either dental trouble or errors in feeding.

Mr. E. Porter-Smith agreed with previous speakers that the day was gone when "colics" were regarded as of such overwhelming importance. Cases were not so frequent nor so serious—changes due, he thought, to improved horsemastership.

They certainly ought to make more careful *post-mortem* examinations. He had no doubt that many *post-mortem* findings that he had seen were due to the *S. vulgaris*, but was sure that faulty feeding, with fermented or other unsuitable materials, was responsible for more cases than Captain Pillers appeared to think.

Another point was that, although many light horses were known to have heavy infestations of intestinal parasites, "colic" was not common with them as a class. They, as a rule, had more attention paid to their feeding and general management.

Mr. Wm. Gibson asked the essayist if he could give any details of the possible diagnosis of aneurysm before "colic" was shown. He would also like to hear details of intravenous treatment.

If blood horses were, as was well-known to be the case, commonly infested with worms, why was colic so comparatively rare among them?

Mr. R. Swaby said that as his contribution to the discussion, he would give details of a recent case. He was interested in a thoroughbred mare. She was fit, and in fact due to race on the Saturday, was taken ill on the previous Thursday and died on the Sunday.

The veterinary surgeon in attendance was not prepared to give a definite diagnosis, but after a *post-mortem* ascribed death to toxæmia, the most conspicuous picture at the autopsy being hæmorrhagic patches on the diaphragm and the bowel. Dr. Sheather found encysted Strongyles in the diaphragm and in the bowel wall. There was no aneurysm. Death, no doubt, was due to toxæmia following Strongylidosis. He would be obliged if Captain Pillers could give details of intravenous medication.

Mr. Gibson, Jun. asked for information as to the length of the parasite's life-cycle. How long did it live in the body and how long in the field?

The President (Mr. G. Eaton) observed that he had listened both to the paper and to the discussion with great interest. He had many times found the routine examination of dung by the sugar flotation method a great help in diagnosis: it was easy, quick, and (as he had said) of great assistance.

The Reply

Captain Pillers, in reply, thanked Mr. Lang very much for the manner in which he had opened the discussion and other members for the part that they had taken. He had hoped and expected to be criticised, but nothing of a really controversial nature had arisen.

Mr. Lang and members present had said that "colic" was not common in blood horses; other observers, however, affirmed that changes in the intestine due to impaction were common and fatal. He had never been a great employer of the tube until he saw it in the hands of Mr. Lang, but it was now in general use with him and animals derived great benefit from the tube and all that went with it.

Before dealing with points raised, Captain Pillers stated his intention of confining his remarks to *S. vulgaris* and not dealing with Strongylidosis in general.

The ordinary clinical pictures of strongylidosis were well-known to them—filled legs and faulty heart action: the hunter with a "temperature" at night that was normal in the morning: cases of intermittent diarrhœa. All these were due to strongyle infections, but he intended to confine himself to *S. vulgaris* and its aneurysms.

He had nothing to say about army debility cases, mentioned by Mr. Lang, but agreed that salt and formalin must have a good effect.

With regard to impaction of the cæcum, he was sure that for many years cases were not recognised and was equally sure that with the tube and salines, the majority recovered.

In reply to Mr. Hudson, he did not think that worm larvæ were the "be all and end all" of "colic." A careful enquiry into the possible cause should always be made, and he agreed with Mr. Hudson and others as to the importance of dental troubles and dietetic errors in the causation of colic. He was even prepared to admit that in some districts such cases might be in the majority.

When, however, these probable causes did not exist, and "colics" did still occur, then he was sure that a more careful examination would show that many cases were due to the cause that he had indicated.

Amongst army horses "colic" was apparently neither so common nor so serious since the strongyles had been persistently dealt with. Similar experience was common in many continental studs and troops since regular "worming" had been introduced.

He agreed with Mr. Lockwood as to the importance of dental troubles. Many had observed that after the removal of one or more molars, one must always be prepared for an impaction of the double colon.

Another point that he might mention had reference to those cases which, during life, were diagnosed as twist, but in which at *post-mortem* there was no twist to be seen—in slaughter-house terms, "a twist that had come undone." Surely many of these must have been verminous in origin.

In reply to Mr. Gibson and others who had remarked on the comparative rarity of "colics" among thoroughbreds, although many were known to have heavy worm infestations, the very last *post-mortem* he attended was on an almost thoroughbred horse, which revealed thromboembolic lesions.

He was afraid that he could give Mr. Gibson no information as to the definite diagnosis of the verminous aneurysm. Nor, at the moment, could he give particulars of all the intravenous medications in detail. A one per cent. solution of antimony pot. tart. was used, about 1·5 grammes of the salt. It was very irritant and should be given with the usual strict precautions. Abroad, the alimentary anthelmintics usually employed

were carbon tetrachloride or chenopodium, followed by antimony pot. tart., 4 to 5 grammes. In other cases proprietary preparations were in use.

The case described by Mr. Swaby was interesting and it was quite likely that a toxæmia followed strongylidosis, but he was confining himself that afternoon, to the larval stage of *S. vulgaris*.

During the discussion the question had been raised as to how to deal with the parasites in the stage between ova and larvæ. This was difficult, if ordinary horse breeding operations were not to be interfered with. All excreta should be carefully collected and stored in heaps or in manure boxes, in which a temperature was developed sufficient to destroy the larvæ.

Another method—which, however, entailed a lot of work—was to keep a heavy layer of earth over the manure heap. The manure should finally be disposed of on land that was not used for grazing equines.

How long did the complete life-cycle take? This, again, was a question on which it was difficult to be dogmatic. There was not much reliable data, but it would in all probability be the same as with other parasites of the same class, *viz.*, somewhere in the region of three months; but it might be much longer, owing to adverse conditions and lack of opportunity of infection. How long did it live in the fields? Again, it was difficult to be exact: there were so many factors to consider, atmospheric and other climatic conditions varying tremendously; however, it did not appear to survive long if dry and desiccated, but for safety one ought to regard it as probably extending through parts at least of four consecutive reasons in natural order, *i.e.*, a portion of the end of spring, summer, autumn, and a little of the beginning of winter.

In concluding his reply, Captain Pillers said that he would like to bring to their notice Mönnig's new work on parasites. In addition to morphological data, it contained much of considerable value on the clinical side.

BENJAMIN WARD RICHARDSON MEMORIAL LECTURE

The Annual Lecture arranged by the Model Abattoir Society is to be given on Tuesday, November 27th, at 5.30 p.m., at the Royal Sanitary Institute, Buckingham Palace Road, by Sir Leonard Hill, M.B., LL.D., F.R.S., who will take as his subject "Electric Methods of Producing Humane Slaughter." Admission is free, without ticket.

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Strong protests are being made by various organisations representative of farmers against the giving of orders by medical officers of health for the supply of pasteurised milk to schools, this practice being described in some quarters as a "back-door" method of securing compulsory pasteurisation. The allegation that the action of the medical officers has been dictated by the Ministry of Health has been refuted in Parliament.

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Herefordshire Agricultural Committee have passed a resolution asking the Ministry of Agriculture to make an order that cattle examined by county veterinary officers under the Milk Marketing Board's Accredited Producers' Scheme found to be suffering from tuberculosis should be branded before being placed on the market.

Abstracts

[Observations on Sterility of Cattle in South Africa. Quinlan, J. (Sub-Director of Veterinary Services, Department of Agriculture, Onderstepoort, Pretoria, Union of South Africa). Paper No. 9, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

Sterility of cattle as it is observed in South Africa is discussed. Certain aspects of sex physiology in sheep and the results of observations made by the author which are relevant to the discussion are explained. The incidence of infertility in cattle in South Africa and southern Rhodesia is shown in tabular form. In data obtained from a questionnaire to prominent farmers, more than 40 per cent. of herds were found to be affected with infertility, either general or as isolated cases.

The major causal factors of infertility in South Africa are of infectious or nutritional origin. Dietetic factors are of more than ordinary interest since in certain cattle-raising centres there is a general phosphate deficiency and for the greater part of the year there is a protein deficiency in addition.

Native cattle are far less likely to be infertile, inasmuch as they are more resistant to infections of the genitalia and more acclimatised to the environment associated with genital disease than imported cattle and their progeny. It is rare to observe widespread infertility in a herd of native or Afrikander cattle. However, seasonal infertility is common during severe droughts.

Infertility of infectious origin has greatly increased with the importation of cattle from Europe. It is not contended that infection was imported with these cattle; rather, an environment was created simulating conditions in Europe, while in addition imported cattle and their progeny do not become quickly acclimatised to South African conditions.

The principal local cause of infertility is chronic catarrhal endometritis. Tubal and ovarian lesions appear in most cases to be secondary to previous or concurrent uterine lesions. Uterine catarrh is most commonly found in herds in which abortion caused by *Brucella abortus* is widespread, but it has also been seen in herds which fail to react to the agglutination test. Anything which reduces natural resistance to infection, such as unsuitable general and sex hygiene, unsuitable rations, unfavourable climatic conditions, heavy feeding, and close housing, favours the spread of genital disease. In other words, an artificial environment favours the spread of pathological conditions involving the genitals.

Granular vaginitis exists among the herds of

the Union of South Africa. Its streptococcic origin (Ostertag) and its artificial transmission have not been established, but it is frequently met with in herds suffering from temporary infertility. No other pathological causal factor could be proved and infertility disappeared with the subsidence of the acute inflammation of the genital mucosa. The detrimental effects of the normal vaginal secretion on the spermatozoa of the ram are emphasised. The most favourable influence of the cervical secretion is indicated. It is not to be believed that abnormal vaginal exudate has no detrimental effect on the vitality of highly sensitive spermatozoa. It is probable, therefore, that in cows served early during œstrus the spermatozoa do not survive the arrival of an available ovum after having been in contact with the exudate from the pathological vaginal mucosa. The author suggests experiments which will clear up the present controversy on the etiological significance of granular vaginitis in relation to infertility.

In connection with functional sterility of nutritional origin, two experiments are discussed. Heifers have been kept from the age of 15 months in high condition, with very restricted exercise, in a darkened stall for three-and-a-half years. They were fed a dry ration of maize meal, bran, and teff hay with a quantity of maize ensilage during three winter months. Still they bred as well as the control cattle, provided they were regularly bred. Therefore, lack of sunlight, lack of exercise, and high condition do not appear to be simple factors in the causation of infertility. The disturbance of the œstrogenic mechanism or conceptive process appears to be more complex.

Other cattle kept under somewhat similar conditions, but not bred for the first time until they were four to five years old, became difficult breeders or hopelessly sterile. It appears that long periods of controlled breeding are unfavourable to subsequent successful breeding history.

It is suggested that uterine hypoplasia and atrophy of the uterine mucosa, seen in some of the heifers mentioned, are of constitutional rather than of infectious origin, since there was no history of genital disease. The cattle were kept under ideal conditions of isolation, general hygiene, and they had not been bred.

Infertility in the bull, although of economic importance, does not play such an important rôle as in the cow; nevertheless, the careful genital examination of all males, prior to and during the breeding season, is essential. The morphology, differential count, and duration of vitality of the spermatozoa *in vitro* are, in the absence of breeding history, good indicators of potential breeding power.

The general principles adopted to combat infertility in South Africa are discussed. These consist of creating improved resistance to disease by dietetic and hygienic methods. The lack of clinical experts in genital pathology makes a general campaign of therapy on physiological and etiological lines impossible. Local uterine and ovarian therapy, operative and hormonic therapy, have been carried out in experiments conducted by the author. The results of this experimental work have been previously published.

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[**A Proposed Method of Veterinary State Organisation.** Leclainche, E. (Director, International Office for Epizoötic Diseases, Paris, France). Paper No. 79, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

The old methods of police sanitation, efficient as they are against certain diseases already partially conquered (cattle plague, sheep pox, peripneumonia, glanders, hydrophobia, dourine, anthrax, swine erysipelas, etc.), reveal themselves as insufficient in regard to other affections that are spread over the entire world (tuberculosis, hog cholera, Bang's disease, piroplasmosis and anaplasmosis, infectious anæmia, pullorum disease and other affections of birds, Johne's disease, etc.). The widespread diffusion of certain diseases, sometimes the methods of contagion, and in particular the presence of germ carriers, explain the difficulties encountered.

Prophylaxis has given considerable results, and the example of the United States and of Canada shows what may be accomplished. However, its facultative character subordinates its application to economic considerations and the States cannot in all cases lend efficacious assistance.

In effect, we renounce eradication for a number of diseases, and we seek instead to limit the losses to a supportable economic total. This decision implies a regrettable but eminent impotence of sanitary police.

If we could practically and economically under existing conditions bring about the eradication of the prevalent diseases, could we then build up healthy herds and give them adequate protection?

In the first place, carry on research work, evaluate the knowledge and its worth concerning methods of health, that is to say, the complete identification of a series of diseases as determined for each species of animals, mammals and birds.

Utilise preferably, or exclusively, healthy animals for the building up of herds and replace infected ones that cannot be profitably held.

Certification of healthy animals with a "certificate of health" given by the State, a State organisation, or authorised private organisations, guaranteeing not only that the animals are free from the diseases covered by the certifi-

cate but that they are from herds and sales animals equally free from diseases.

The delivery of these certificates would imply not only the use of the various means of diagnosis expressly prescribed but also the continued sanitary supervision of the animals.

This system would consequently associate the veterinarian with hygienic procedures in the permanent control of the handling of animals.

Whether or not this mode of intervention is approved, it is necessary to oppose hasty measures supposed to be efficacious in the eradication of existing diseases, for fear of losing the confidence of the stock raisers and with that the benefits of the great service rendered them by veterinary medicine.

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[**Deficiency Diseases.** Hart, G. H. (Professor of Animal Husbandry, College of Agriculture, University of California, Davis, California, U.S.A.). Paper No. 12, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

The successful control of widespread infectious scourges of animals has caused more attention to be given to the less spectacular but serious economic losses from conditions of entirely different origin. Etiological factors must be considered in the fields of bacteriology, parasitology, genetics, and nutrition.

A complete diet is difficult to define for animal life in general. The ratio of mineral elements, acid-base balance, total-energy intake, biological value of the proteins, specific effect of fat and vitamins, all present problems somewhat different in each species.

Deficiency diseases in greatest variety are most likely to be encountered in the semi-arid range areas where animals are obliged to subsist entirely on the natural vegetation. However, pet animals in large cities, poultry in farm flocks, and heavy-milking cows on intensively cultivated lands, all supply their quotas. The literature on the subject is confusing because of the many local names applied to the same condition in different parts of the world. Also, different deficiencies may give rise to more or less the same syndrome; for example, any one of calcium, phosphorus, vitamin D, or sunlight shortage will give rise to bone deformities. The important mineral deficiencies discussed are phosphorus, calcium, iron, copper, and iodine. Magnesium, manganese, and chlorine deficiencies are mentioned.

Vitamin A is the most important substance in the vitamin group, followed closely by vitamin D. Vitamins B and C are not so important because of the rarity of deficiency, since they are synthesised in the bodies in some species. The reproductive vitamin E is widely distributed in nature, and so far the manifestations of its absence have been confined to rats on highly purified diets. Deficiency of vitamin G is associated with black tongue in dogs, and its absence causes one form of leg paralysis in chicks, probably making it the most important of the water-soluble vitamins in animal nutritional abnormalities.

Deficiency of vitamin A may affect the calcium-phosphorus balance, cause nutritional roup in chickens, swell head in turkeys, resorption of fœtuses in pregnant sows, so-called cottonseed poisoning in cattle, nutritional abortion in cows, night blindness and corneal ulceration in growing cattle, and fatal diarrhœa in new-born calves. The time required for symptoms to appear depends on the quantity of carotene stored in the liver when the animal is placed on vitamin A-deficient diets. Liver oil of cows may be a better source of vitamin A than cod-liver oil.

Vitamin-D deficiency manifestations in the absence of sunlight are associated with changes in the bones.

Finally, mention is made of the importance of supplying dietary essentials as far as possible in natural foods. When special mineral or vitamin preparations are required they should be obtained under their trade names rather than in proprietary mixtures. The latter are too frequently of little value, if not really harmful, and at best are usually sold at excessive prices compared with their actual cost. The advertising and distribution of many of them constitute an exploitation of the livestock industry by the manufacturers.

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[**Coryza and Other Respiratory Infections in Chickens.** Beach, J. R. (Professor of Veterinary Science, Division of Veterinary Science, College of Agriculture, University of California, Berkeley, California, U.S.A.). Paper No. 30, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

This report is not limited to coryza alone, but includes a discussion of infectious laryngotracheitis, formerly termed "infectious bronchitis," and of a respiratory infection of young chicks, diseases of which coryza may or may not be an essential part.

The causative agent of infectious laryngotracheitis has been shown by several investigators to be a filtrable virus. The virus has been regularly present in laryngeal and tracheal exudate and irregularly in spleens, livers, and blood of infected fowls, though it does not lead to characteristic changes in the latter tissues. Seifried has demonstrated intranuclear inclusion bodies in the epithelial cells of diseased tracheal mucosa. Marked resistance of the virus to desiccation and glycerine has been demonstrated, but it was quickly destroyed by exposture to temperatures of from 55° to 75°C., to direct sunlight, and to 5-, 3-, and 1-per cent.

solutions, respectively, of phenol, liquor cresolis compositus, and sodium hydroxide.

The disease attacks primarily the mucosa and submucosa of the larynx and trachea, although infections of nasal and conjunctival mucosa and of the lungs sometimes occur. The disease has been reproduced only in chickens and, in one instance, pheasants. Ducks, turkeys, pigeons, doves, sparrows, crows, starlings, rabbits, guinea-pigs and white rats were refractory. Chickens have been found to carry the virus in their trachea for as long as 16 months after recovery from the disease.

A method of treatment of proved effectiveness in alleviating the symptoms or reducing the mortality of diseased fowls has not yet been found.

Hudson and Beaudette have found that the tissues of the cloaca and bursa of Fabricus are susceptible to the virus, that infection of these parts does not spread to the respiratory tract but rather renders the fowl immune to infection of the respiratory tract, and that the phenomenon could be applied in the immunisation of fowls on poultry farms. The "vaccination" procedure consists of the application of a suspension of desiccated tracheal exudate to the mucosa of the proctodeumal portion of the cloaca. Beach, Schalm, and Lubbehusen conducted extensive field trials of this procedure and found that it gave highly satisfactory results in some flocks, whereas in others fowls were immunised, in satisfactory numbers, either not at all or only after two or more applications of virus. A modified method of vaccination, consisting of injecting the virus suspension or "vaccine" into the bursa of Fabricus, was reported to be a more certain means of establishing bursal and cloacal infection and resultant immunity. Gibbs likewise reported "bursal vaccination" as more effective than cloacal. Immunity of fowls a year after vaccination has been demonstrated.

A respiratory disease of chicks clinically similar to infectious laryngo-tracheitis has occurred in certain sections of the country. Some investigators report that the infection is confined to tracheæ, bronchi and lungs, whereas others have observed frequent involvement of the nasal passage and report that, in outbreaks of the disease, either nasal or tracheal and bronchial infection may be predominant. The causative agent has been shown to be a filtrable virus. Bushnell and Brandley concluded that the virus and disease are identical with infectious laryngo-tracheitis, but Beach and Schalm believe that their experimental results show that the two are unrelated.

Nelson has studied three types of uncomplicated coryza differing from one another in length of incubation period and the course of the disease. However, one type (coryza III) is regarded as the basic form of the disease and the others as variants of it. All types were readily transmitted by inoculation of susceptible fowls with nasal exudate or by contact. A Gram-negative bacillus which has been isolated from the nasal exudate is believed to be the causative organism. This organism colonised on blood agar plates only when they were sealed to exclude air. Fowls inoculated with cultures regularly developed coryza similar in character but milder and of shorter duration than that produced by inoculation with exudate.

Delaplane, Stuart and Bunyea have studied a severe type of coryza which appears to bear considerable resemblance to Nelson's coryza III. The disease was readily transmitted by inoculation with exudate and from the exudate a Gram-negative bacillus was isolated which requires a medium containing blood for its growth.

A coryza studied by Schalm and Beach appeared to differ from that of Delaplane *et al.* only in that a rather high incidence of involvement of tracheæ and bronchi was observed. Here again a hæmophilic Gram-negative bacillus has been isolated with which a respiratory infection can be produced, differing from that resulting from inoculation with exudate or from contact exposure only in respect to severity of symptoms and length of course. This organism failed to colonise on open or sealed blood agar plates but grew steadily on such media in an atmosphere of 10 per cent. carbon dioxide.

It appears likely that these various coryzas ultimately will be shown to be variants of one infection rather than separate disease entities.

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[Trypanosomes Pathogenic to Domestic Stock and their Effect in Certain Species of Wild Fauna in Uganda. Carmichael, J. (1934.) *Ann. Trop. Med. and Parasitol.* 28. 1. pp. 41-45. (6 refs.)]

It is well-known that game in tsetse areas act as a permanent reservoir for the trypanosomes that are responsible for disease in man and domestic animals and, appear to suffer no ill-effects. It is not known whether this tolerance is acquired by prolonged contact with the infecting agent or is an inherent property of the body fluids of wild game animals.

Carmichael has, therefore, studied the effect of *Trypanosoma brucei* and *T. congolense* on wild animals from tsetse-free areas. Three ntalaganya (*Cephalopus caerulus melanorrheus*), one reedbuck (*Redunca redunca*), one waterbuck (*Cobus defassa*), one oribi (*Montana cattoni cottoni*), one duiker (*Cephalopus grimmi*), one bushpig (*Potamochoerus chaeropotamus*) and a multimammate mouse (*Mus coucha*) were inoculated with pathogenic strains of *T. brucei* and *T. congolense.*

One ntalaganya died of *T. brucei* infection, another showed *T. congolense* in its blood after

inoculation but suffered no ill-effects and the third, which was infected by cyclical transmission through laboratory-bred *Glossina morsitans*, showed trypanosomes in its blood and was inclined to lose flesh with slight anæmic blood changes. Five months later it was showing no ill-effects when it died from an accident.

The reedbuck did not become infected from an inoculation of *T. congolense* and was later inoculated with *T. brucei* which appeared in its blood though it remained healthy.

The waterbuck seemed to resist infection with *T. congolense* though waterbuck have been shot showing natural infections. It appeared susceptible to a transient infection with *T. brucei* from which it made a complete natural recovery.

The duiker suffered transient infection with *T. brucei* followed by complete recovery.

The oribi appeared to resist two inoculations of *T. congolense* though natural infection was reported by Bruce.

The bushpig resisted infection with both species of trypanosome. *T. brucei* and *T. congolense* both proved pathogenic to the jackals which are often found in tsetse areas though they are mainly nocturnal in their habits.

The multimammate mouse showed no resistance to *T. brucei* and died in three days.

A number of the animals are still alive and observations are being continued. J. S. S.

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[**Studies in Immunity to Trypanosomes. I.—Acquired Immunity in *Trypanosoma equiperdum*-infected Rats. The Rieckenberg Reaction.** Raffel, S. (1934.) *Amer. Jl. Hyg.* 19. No. 2. pp. 416-448. (2 pp. refs.)]

The disease caused by *Trypanosoma equiperdum* in rats has always been recognised as acute, the parasites being virtually confined to the bloodstream where they multiply continuously, causing death in from three to six days after inoculation. Death usually occurred when the organisms were literally swarming in the blood. In this (continuous) type of infection anæmia, is the characteristic cellular change observed in the blood; the sharpest decline takes place after the trypanosomes have begun to appear in the blood in appreciable numbers. The only constant change in the leucocyte count was a rise about 24 hours after infection; the differential count, however, remained constant. The sex of the animal had no influence in the acute type of infection but there was some indication that the infection was more protracted in animals of greater weight. Contrary to the results obtained by other workers, Raffel was able to produce a relapsing type of infection in rats when the infective doses of *T. equiperdum* were within certain limits. It was found that small doses of the viable organisms led to the production of humoral immunity, although the eventual fatal outcome of the disease was unaltered, since some of the parasites possessed the ability of themselves becoming resistant to the host immunity.

The use of the "Rieckenberg" test (adhesion phenomenon) showed that humoral immunity might be produced some time (up to 14 days) before organisms occurred in the blood stream. This test showed that the immunity was strictly strain specific and it was found that the Rieckenberg or "thrombocytobarin" antibody was associated with the globulin fraction of the serum, previous reports having assigned it to the fibrinogen of the plasma.

Smaller or sub-infective doses of viable organisms were apparently killed by the natural resistance of the animal soon after entrance into the body. At all events, they were given no opportunity to develop and multiply. No immunity was produced by sub-infective doses of living trypanosomes, the conclusion being drawn that the continued presence of living parasites, even if latent, is necessary for the production of immunity. J. S. S.

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[**"Water Bloom" as a Cause of Poisoning in Domestic Animals.** Fitch, C. P., Bishopp, Lucille M., and Boyd, W. L. (1934.) *Cornell Vet.* No. 1. 30-39.]

The authors record a series of sudden deaths amongst livestock, and in each case the circumstances have suggested that they were brought about by an excessive growth of blue-green algæ on the surfaces of lakes used for drinking purposes. The most recent outbreak was in September, 1933, when cattle, sheep, lambs, pigs and fowls died shortly after drinking from a certain lake. The water was found to be heavily infested with *Microcystis, Anabæna* and *Aphanizomeon flos-aquæ* which the prevailing wind had blown in large quantities into the drink-places. The intraperitoneal injection of 2 c.c. of this water into guinea-pigs produced death in seven minutes. Feeding the material also caused the death of guinea-pigs, rabbits and chickens, provided that the algæ had not been stored for any length of time and had not become dried. Intraperitoneal injection of dried material killed animals in the same time and in the same dosage as fresh material. The symptoms shown by the larger animals were prostration, convulsions and death; experimental animals showed restlessness, deep breathing, weakness in the hind quarters, coughing, salivation, lachrymation, clonic spasms and death. Chemical examination has not revealed the toxic principle, which disappears upon the putrefaction of the algæ. In this country, algæ growing on the surface of ponds are considered entirely harmless, but it may be that they are never present in sufficient quantity to be harmful, owing to the fact that there are no large areas of shallow water suitable for their abundant growth. J. A. N.

Reviews

[**Coccidia and Coccidiosis of Domesticated Game and Laboratory Animals and of Man.** Elery R. Becker. (1934.) pp. ix-147. 25 figs. 8 plates. 7 tables. 337 refs. Collegiate Press, Inc., Ames, Iowa. $2.50.]

The author states that he has tried in this monograph to bring together the findings of very many workers in this field, for the benefit of the biologist, the pathologist, the practitioner and the educated animal breeder.

He has produced a very valuable work of reference for all those interested in the literature on this subject.

The first chapter gives a general account of the life cycle of the parasite, followed by chapters dealing with the different species found in various hosts, with notes on host-specificity, the nature of the species, the relationship to disease, immunity, methods of reducing infection and tolerance of the oöcysts.

Therapeutics are dealt with by detailing a list of substances which have been tried and found to be of little or no value and others which have given more encouraging results.

Three appendices are included:—

1. References to articles on coccidia of some vertebrate hosts not treated in the text.
2. Host catalogue.
3. Notes on technique.

Author and subject indices are included.

The author gives due acknowledgment to all the workers from whose publications he has drawn in the preparation of this book.

The book has been very well compiled and published.

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[**Poultry Ailments.** W. P. Blount. (1934.) pp. 306. 29 plates. Published by *Poultry World* Ltd., price 5s.

The early chapters of part one of this book deal with the anatomy but to a larger extent the physiology of the fowl. Interesting chapters follow in which various aspects of poultry keeping—such as rearing, culling, dietetics—are discussed and articles on the transmission of disease and disinfection are included.

The diseases of poultry are dealt with in part two of this book. These articles on disease are arranged alphabetically, which in the reviewer's opinion is not an advantage to the reader. Diseases caused by bacteria are mixed with internal and external parasitic infestations, injuries, and conditions resulting from dietetic errors, etc., etc.

The articles are well written in the light of our present knowledge and will be very useful for those interested in poultry and the diseases with which they are afflicted.

A glossary is appended for the benefit of poultry owners who may not be familiar with some of the more technical terms.

The publishers' work has been very well carried out.

Report

VETERINARY DEPARTMENT, UGANDA, 1933

Few Veterinary Departments make themselves responsible for such varied efforts as the one in Uganda and few reports are so detailed. That for the year 1933 extends to 50 pages and two instructive maps. The burden of producing it has thrown no light task upon the officer responsible. It will be realised that in a survey such as this, space will only permit of reference to a few points.

The report shows that the departmental activities embrace disease control; education; animal husbandry; stock farms; ghee, butter and milk supplies; meat inspection, and research. From various sources, revenue amounting to £14,776 was collected—a useful sum for a "spending" department.

Disease.—A peculiarity of the incidence of rinderpest has been that, whilst some districts have narrowly escaped decimation of cattle, others, where the disease has been common in the past, were maintained free from infection. The whole of the chapter dealing with rinderpest is a record of unceasing struggle against the many carrier agents. The cattle of migratory tribes and game are the principal ones, the latter presenting the most difficult problem. The susceptibility of some varieties is known and recognised; in others the spread is so slow and insidious as to create a feeling of safety where such is not justified. Further difficulties were such as are, alas, too common since troubled economic conditions commenced. The Veterinary Pathologist was asked to increase his output of serum from 10,000 to 28,000 doses per month, and, at the same time, to dispense with one of his staff.

Inoculations with "antimosan," in cases of trypanosomiasis, freed the peripheral blood from parasites. A few breakdowns were noted, but these may have been due to re-infection. Although generalised tuberculosis was infrequent, it is disquieting to find that the average infection was as high as 12 per cent. in one district. It is hoped to be able to press forward work on this important problem. Twenty-one outbreaks of foot-and-mouth disease were reported, but quickly localised. The mortality was negligible. Reclamation of tsetse-infected

country is being carried out by thinning the bush. The work is proving satisfactory and cultivation is increasing.

African assistants are being educated by giving them a five years' course. They are then attached to a veterinary officer and given refresher courses from time to time. They are playing an increasing part in the work of the department.

Animal husbandry endeavours aim at improving the scrub animal by the castration of undesirable bulls, and its work also embraces such varied activities as demonstrations on the training of oxen for work; the experimental breeding of reptiles for the skin market; propaganda in connection with the preparation of hides for sale; breeding of improved stock, and demonstrations in ghee and butter making. The list shows that Mr. Poulton and his staff are awake to the necessity for promoting that advance of the African which is so essential to the progress of the territory. They are to be congratulated on a year of effort and progress.

J. S.

In Parliament

The following questions and answers have been recorded in the House of Commons recently:—

Foot-and-Mouth Disease

Lord Apsley asked the Minister of Agriculture whether the original causes of infection have as yet been traced which have caused the many outbreaks of foot-and-mouth disease in the Western and South Midland Counties of England this month; whether he is yet in a position to state to what causes these outbreaks may be attributed; and whether or not he considers them to be all spread from an original outbreak or to have been caused by different agencies acting independently?

Sir G. Bowyer: Outbreaks of foot-and-mouth disease have occurred during this month in six areas, the majority of the cases being in the Lindsey, Lincolnshire area. Two outbreaks near Grimsby were probably independent of the other cases in that area, in which, however, the means of spread of infection have not definitely been established. The initial cause of infection in any of these six areas has not yet been traced; in the case of one area, however, namely, that at Thornbury, Gloucestershire, it is thought that the outbreak may be the recurrence of a previous outbreak in September. No evidence has been obtained which would indicate that an outbreak in any one of the infected areas has been responsible for the occurrence of disease in any of the other areas concerned. The history of the animals involved and their management in the initial case in each of the affected areas vary widely, which suggests the likelihood of different agencies acting independently.

Lord Apsley: Has any general cause been discovered as the reason for these outbreaks at the present time?

Sir G. Bowyer: No, Sir.

Mr. Macquisten: Is there any reason to suspect that they are caused maliciously?

Sir G. Bowyer: I think none.

N.V.M.A. Divisional Reports

CENTRAL VETERINARY SOCIETY

Sixty-First Annual Dinner

PRESENTATION OF THE "VICTORY" MEDAL TO PROFESSOR WRIGHT

The recently-instituted practice of the Central Veterinary Society of making the Annual Dinner also the occasion for a dance, again proved a success in connection with this year's function—the sixty-first in the series—which was held on Thursday, November 1st, at the May Fair Hotel, W.

The President of the Society, Mr. Leonard S. Balls, was supported by a satisfactory number of Fellows, with their ladies, while Mr. G. H. Locke, President of the Royal College, honoured the proceedings with his presence. A feature of the evening was the presentation of the "Victory" Medal to Professor J. G. Wright, of the Royal Veterinary College, while the opportunity also was taken to give some tangible expression to the gratitude felt by the Fellows to Captain J. F. Macdonald, who filled the onerous post of Hon. Secretary to the Society over a number of years with outstanding diligence and ability.

THE PRESIDENTS

Mr. G. H. Locke (President, Royal College of Veterinary Surgeons), in giving the toast of "The Central Veterinary Society," expressed the pleasure he felt at being there that evening and his thanks for being accorded the honour of proposing that toast.

He had been given to understand that that evening was to be devoted to amusement, not to business, and that therefore speeches were to be brief. It was of no use his giving them veterinary propaganda and politics, because their Society, if it had one more member on the Council of the Royal College of Veterinary Surgeons, would have a 50 per cent. representation on the governing body of the profession, which was proof of the strength of that important Society. (Hear, hear.)

It was very nice to see the Central Veterinary Society holding its sixty-first annual dinner: they were the fifth oldest Society in the country. One of the younger members of the profession was asking him what his Society (the Lancashire V.M.A.) had ever done for the veterinary profession, and he felt it incumbent upon him to tell his questioner that his Society had done fine pioneer work "before he was born," and indeed he would like the younger members of the profession to understand that they were reaping the benefit of the work accomplished by the enthusiastic pioneers of earlier days. (Applause.)

In that connection, he was recently reading that as long ago as the year 1885 Manchester veterinarians suggested a scheme whereby they should approach the Medical Officer of Health and endeavour to impress upon him their view that members of the veterinary profession were the right people to be entrusted with the inspection of meat and milk. That recognition was not long in coming in Manchester, and to-day similar proposals were afoot in regard to milk, and all this afforded evidence of the indebtedness of the veterinarian of the present day to those who had taken the first steps along the difficult road that was leading to his recognition as an agent of the first importance in the safeguarding of the public health.

He congratulated the Central Veterinary Society upon its strength and progress, and wished them every success. He congratulated the President upon his election as head of such a great Society, and hoped that he would have every success in his year of office: he was sure that Captain Balls could count unreservedly upon the unanimous support of the members. (Loud applause.)

The President of the Society (Captain L. S. Balls), on behalf of the members, thanked Mr. Locke for the generous references he had made to the Society in proposing that toast. But both the President, in proposing the toast, and the company, in receiving it so enthusiastically, were thinking, not of their individual selves, but of the Society which, though they composed it, was greater than all of them put together. That Society had existed for more than 60 years. It began life before most of them were born and would continue long after they had gone. Its name would endure when theirs were forgotten; therefore they were toasting something greater than themselves and they could all be sincere in drinking to the success of the Society and in expressing the earnest hope that its future would be greater than its past. (Applause.)

They thought it a very great honour that Mr. Locke, during his year of office as President of the Royal College of Veterinary Surgeons, had been willing to come so many hundreds of miles to be with them that night. (Applause.) They would like to congratulate him sincerely on the high honour he had attained. (Hear, hear.) He felt that he was voicing the feelings of all present when he said that they were proud that he, as a general practitioner, had become for the time being the titular head of the profession. They appreciated his presence with them that night and they hoped that he would feel, by the warmth of the welcome accorded him, that the tiresome journey was worth while. (Applause.)

On looking round the room, Mr. Locke would be sure to feel quite at home, for he could not help but recognise some of his colleagues on the Council of the Royal College of Veterinary Surgeons, in spite of the fact that they were not dressed in their robes as councillors. It was a fact, he believed, that the Central Veterinary Society had never put a candidate up for election to the Council of the Royal College, but members of that Society seemed to gravitate there. There were, he thought, a dozen of their members on that Council: that gave some indication of the interest members of that Society took in the welfare of the profession.

Continuing, the President said that if he might be allowed to strike a more personal note, he desired to say that he was looking at his diploma that day—when he had the pleasure of the company of the President, R.C.V.S.—and he happened to read on it the name of Mr. Sam Locke, Mr. Locke's father, who was then Vice-President of the Royal College. He felt it a great honour that the name of Mr. Locke's father should be on his diploma. (Hear, hear.)

He desired once more to thank Mr. Locke for the very kind and generous way in which he had proposed that toast. (Applause.)

Presentation of the "Victory" Medal

Proceeding, the President said that he had been asked to present the "Victory" Medal which, as they all knew, was one of the highest awards that the Society could make to one of its members. He had very great pleasure in presenting the medal that year to Professor Wright, of the Royal Veterinary College. (Loud applause.)

Before he sat down, he had another presentation to make—one that, he felt sure, would delight them all: he was going to ask Captain Macdonald to accept at his hands, on behalf of the Fellows, a clock as a small mark of their appreciation of his many years of hard work for the Society, with particular reference to his long and successful period in office as Hon. Secretary. (Loud applause.)

Professor J. G. Wright, speaking in acknowledgment, said that he keenly appreciated the great honour the Society did him in presenting to him its "Victory" Medal for the year 1934. The necessity of making a speech before such a large gathering was in the nature of a penalty associated with the award, but that had at any rate been lightened by the explicit instructions all speakers had received to be brief, in order that the company might pass on to the more enjoyable part of the entertainment. At the same time, he felt that he could not let what was—for him at any rate—a momentous occasion pass without at least attempting to reply suitably.

On looking around the room, he could see a number of witty and eloquent speakers who could have dealt with a matter such as this in

their stride. To him it was one of considerable difficulty and he approached it with diffidence.

At the moment the veterinary profession would appear to be gravely concerned, rightly or wrongly, for its future welfare, and it would seem undeniable that in the near future certain aspects of their professional work were to undergo modification. But it was not to any political aspect of their future that he wished to refer, but rather to the professional aspect. That the time for specialisation had arrived was now realised, even by themselves. It was obvious that the ramifications of their work had become so enormous that it was quite impossible for a single person to possess the expert knowledge that was required, by the State and by the public, in all its branches, and so they had to specialise.

He was one of the younger men of the profession, and it was to the young men and women that he addressed his remarks. They all had the greatest admiration and respect for their older colleagues—had not the President of the Royal College that evening pointed out that they had done very hard work? In fact, the profession owed its present position to that work. The future success of the profession, however, lay in the hands of the young men and women who were now entering it, and his belief was that specialisation in one or more of the varying branches of veterinary science would be demanded of them.

That Society was composed essentially of clinicians, and being situated in that vast metropolis, the greater part of their work was concerned with small animals, and it was upon that aspect of their work that he felt he might speak. His plea was for greater efficiency. It might be said: "How can we aspire to greater efficiency? The need is for research." This was true, but it must be remembered that during the past few years great advances had been made. As the result of the researches of Laidlaw and Dunkin they had in their hands a weapon with which they could combat the greatest scourge of the dog—canine distemper. It was to be hoped in consequence of the work originated by Hindle and his co-worker Findlay, and being continued by Dalling and his co-workers, that shortly they would be in possession of a similar weapon wherewith to combat infectious diseases of the cat, but so far as small animals were concerned he felt that the greatest amount of research must be carried out by clinicians—by the careful observation and the recording of facts. By the very nature of things it was only reasonable that any money which the Government could apportion towards veterinary research must go to research into the diseases of the economic—the farm—animals, and it was an extraordinary thing that the greater part of the money so charitably subscribed for the welfare of small animals should find its way into channels where it served little or no useful purpose.

It might be asked: "How can we advance?" He would suggest, first and foremost, in the subject of diagnosis. We should leave no diagnostic aid unexplored with a view to ascertaining all the possible facts. He would remove the term "I am of opinion" from their vocabulary—for the value of that opinion was directly proportionate to the amount of fact upon which it was based—and replace it by the statement: "I have found out the following facts, which are irrefutable." (Applause.) A rational forecast as to the outcome of medical or surgical treatment could only follow complete accuracy in the diagnosis of the disease that existed. If, as the result of facts ascertained, it was found that the case was incurable, the only useful purpose to be served was to make it perfectly clear to everybody concerned at once. The day of the "bottle of medicine" was past, but it had not gone: the implicit faith which the British public placed in this commodity had done much to hamper advance both in medical and in veterinary science. (Hear, hear.)

Familiarity tended to make them careless, and he would urge that, above all things, they should avoid being careless when they were examining their patients, because that was the time when the greatest errors were made. There was no department of their work in which surgery played such a great part as in small animal practice; in fact, he would say that a very large number of cures in otherwise fatal diseases could be brought about by surgical interference and that was another aspect in which he urged the necessity for even greater efficiency. It was reasonable to expect that everyone who claimed to be expert in small animal practice should be expert in all its branches. (Hear, hear.)

In conclusion, he would again like to thank them most sincerely for making him the recipient of the "Victory" Medal.

Captain J. F. Macdonald followed, returning thanks for the gift which had been made to him by the Society. He trusted that they would not think him in any way lacking in gratitude if he just said that he very deeply appreciated their kindness in making him that very handsome presentation, and that his twelve years of office as their Hon. Secretary had been very happy ones for him. He valued more highly than he could say the many friendships that he had made during that time. (Applause.)

At the conclusion of the toast list, the company adjourned, and upon reassembling were entertained by Mr. Harold H. Saunders (conjuror) and Mr. Richard Hassett (humorist), who had also dispensed joviality between the speeches. Mr. Hassett's impressions of the

vendors at Caledonian Market, Islington, struck a topical note, especially for old students of the Royal Veterinary College.

The assembly then gave itself up to dancing, to the excellent music provided by Jack Anderson and his band, which had previously enlivened the gathering with musical items rendered during the reception and dinner.

During the dance interval Mr. Saunders displayed his versatility by a clever demonstration of ventriloquism.

Shortly after midnight, with the joining of hands and the singing of "Auld Lang Syne," a most enjoyable evening came all too quickly to a close.

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NORTH OF ENGLAND V.M.A.*

Meeting at Newcastle-on-Tyne

A meeting of this Division was held at Armstrong College, Newcastle-on-Tyne, on September 22nd, 1934, when the Chair was occupied by the President, Mr. A. C. Forbes, and the attendance book was signed by the following: Messrs. W. J. Young, F. Pickering, T. R. Jarvie, C. G. Hill, P. Snaith, W. B. Towell, F. Christopher, C. Nicholson, T. Wilkinson, J. W. Rider, E. R. Callender, L. E. Perkins, T. M. Mitchell, H. S. Elphick, D. Starkey, W. L. Stewart, and J. R. Rider, Hon. Secretary. Dr. A. W. Stablefo:h and Miss M. C. Clay were present as visitors.

Apologies for absence were received from Messrs. J. D. Peele, J. H. Taylor, J. J. McDowall, H. Hicks, Sir Frederick Hobday, Dr. Bradley, and Dr. J. A. Charles, M.O.H., Newcastle-on-Tyne.

Obituary.—At the outset the President made reference to the loss sustained by the Association by the deaths of two past Presidents, Major H. Peele, and Mr. W. H. Blackburn. Both gentlemen had been old and active members, well-known to those present. The Association had expressed its sympathy with the bereaved relatives, both by letter, and by floral tributes, and it had been represented at the respective funerals. He now asked the meeting to manifest its sympathy by standing in silence.

The Minutes of the preceding meeting, having been published, were taken as read and were confirmed.

Correspondence.—The Secretary reported the receipt of a letter from Mr. W. J. Young, intimating his desire to resign his membership because of his recent promotion in the Ministry of Agriculture Service, which would necessitate his return to Edinburgh. Mr. Young's resignation was accepted with regret, Mr. Mitchell remarking that he felt the meeting should take that opportunity to congratulate Mr. Young, and to wish him every success in his new sphere of activity. Mr. Hill proposed, and Mr. Callender seconded, that the distinction of Honorary Membership should be conferred on Mr. Young. This proposal was received with acclamation by the meeting, and carried unanimously.

Mr. Young, in reply, said he was overwhelmed by the kindness shown him during his stay in the North of England. He was grateful for the honour just conferred upon him. It would, no doubt, be difficult for him to attend their meetings in the future, but he would carry away with him many pleasant memories of the Association, and he would always wish it success in its deliberations.

Election of New Member.—Mr. Young proposed and Mr. H. S. Elphick seconded that Mr. W. Wingate Wilson, of Richmond, Yorks., be elected a member of the Association. This was put to the meeting and carried unanimously.

Deputation to Mr. C. G. Hill.—The Secretary read the report of this deputation, which had been successful in that it had resulted in Mr. Hill re-considering his intention to resign from the Association. The report was received with satisfaction by the meeting.

Council Report.—The Council report, dealing principally with the fees suggested for tuberculin testing of dairy herds, and the clinical examination of grade "A" herds, was received and adopted on the proposal of Mr. Snaith, seconded by Mr. Christopher.

Mr. Mitchell said he was not in agreement with that part of the report dealing with the clinical examination of grade "A" herds. He felt it important that any fee for this work should be justifiable on economic grounds. Since he was of opinion that the fee proposed was too high, he wished to give notice of motion that this part of the report be re-considered at the next meeting.

Distemper Immunisation Fees.—Mr. Mitchell moved a resolution, standing in his name, "That the fees for distemper immunisation be reconsidered." In doing so, he explained that Mr. Hill had brought certain points to the notice of the deputation, and it was felt that they should be considered by the general meeting.

Mr. Hill then placed his points before the meeting, and after a lengthy discussion it was finally agreed to amend the circular letter of March 7th, in the light of the information now available. It was decided that this letter should be rescinded, and a new circular issued in its place, embodying the amended charges for distemper immunisation, and the fees agreed for tuberculin testing.

Paper: "The Control of Contagious Abortion."—Mr. W. Lyle Stewart then introduced his paper on the above subject, also drawing the attention of the meeting to a table illustrating

* Received for publication, November 6th, 1934.

the loss in milk yield due to the existence of abortion in certain areas.

Dr. A. W. Stableforth, Research Institute, Camden Town, London, opened the discussion, which was continued by Mr. F. Pickering, who spoke from the practitioner's point of view.

[Mr. Lyle Stewart's paper, his introductory remarks, and a report of the ensuing discussion, are reproduced at the commencement of this issue.—Ed., *V.R.*]

Vote of Thanks.—The President said that they had listened to a most instructive discussion on a disease of vital importance to the stock owner, and they were grateful to Mr. Lyle Stewart, Dr. Stableforth, Mr. Pickering, and the other speakers for giving them the benefit of their wide and varied experience. He hoped that the report of their deliberations would show that they were alive to the seriousness of the situation, and that their efforts would lead to further study of the problem, and finally to improved methods of control. He was sure the members would wish to accord the writer of the paper, the openers of the discussion and those who had taken part in it, their most cordial thanks. He therefore moved, from the chair, a formal vote of thanks, and he asked the members to show their appreciation in the usual manner. The meeting adopted the President's proposal wholeheartedly, and the proceedings terminated.

J. R. Rider, *Hon. Secretary.*

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LINCOLNSHIRE AND DISTRICT V.M.A.*

Meeting at Lincoln

A meeting of the above Division was held at the Albion Hotel, Lincoln, on Wednesday, October 10th.

The chair was taken by the President, Mr. G. Eaton, and other members present were Messrs. Dowland, Sugden, Logan, Wm. Gibson, G. Gibson, jun., Hill, Keall, Porter-Smith, Lang, Swaby, Foster, Lockwood, Hudson and H. C. Reeks, jun. (Hon. Secretary).

Apologies for absence were received from Messrs. Poles, Townsend and W. L. Gooch, sen.

On the proposition of the President, seconded by Mr. Lang, the minutes of the last meeting, having been published in *The Veterinary Record*, were taken as read.

Paper.—The President then called upon Captain A. W. Noel Pillers to give his paper—"Some Observations on Colic in Adult Cart-Horses due to the Larvæ of *Strongylus vulgaris*."

In introducing Captain Pillers to the meeting, he said that he was sure that they were all greatly indebted to him for making the journey to give them the paper. The subject was one that Captain Pillers had made particularly his own, and the Society was again fortunate in having a master of the craft to address them on his chosen subject. (Applause.)

[Captain Pillers' paper is reproduced in the Clinical Section of this issue, together with a report of the discussion that followed its presentation and which was opened by Captain W. W. Lang (Brigg).]

Vote of Thanks.—The members having accorded a hearty vote of thanks to the essayist and to the opener of the discussion, took tea together before dispersing.

H. C. Reeks, jun., *Hon. Secretary.*

* Received for publication, October 29th, 1934.

Licensing of Stallions under the Horse Breeding Act, 1918

It is stated in *The Journal of the Ministry of Agriculture* for November (Vol. xli, No. 8, pp. 774-776) that the number of stallions licensed in England and Wales under the Horse Breeding Act, 1918, showed a further considerable increase in 1934, 1,687 licences being issued as compared with 1,516 in 1933. The following table shows the number of stallions licensed in each year since 1928:—

	Service Season.			
	1928	*1929*	*1930*	*1931*
Shires	720	760	752	761
Other Heavy Horses	313	329	335	342
Light Horses (including ponies) ...	381	347	343	329
	1,414	1,436	1,430	1,432

	Service Season.		
	1932	*1933*	*1934*
Shires	853	888	962
Other Heavy Horses ...	358	387	471
Light Horses (including ponies)	266	241	254
	1,477	1,516	1,687

The number of heavy stallions licensed increased from 1,275 in 1933 to 1,433 in 1934; Shires increased by 74, Suffolks by 28, Clydesdales by 25, and Percherons by 14. The number of light stallions licensed was about the same as in the previous year, but pony stallions advanced from 61 in 1933 to 73 in 1934.

Licences were refused in respect of 45 stallions, an increase of five as compared with 1933. Seven appeals against refusals were lodged as compared with ten in the previous year, and five of them were successful. The breeds of the stallions rejected and the reasons for their rejection are given in the table overleaf.

Twenty-six infringements of the Act were reported to the Ministry during the season as against 17 in 1933. Successful proceedings were taken by the Police in two cases where unlicensed stallions were being travelled for service or being exhibited on premises not in the owner's occupation with the object of their use for service. Most of the other infringements reported were in respect of the travelling or exhibiting for service of licensed stallions unaccompanied by their licences, and in these instances the owners and

leaders were warned by the Ministry or Police as to the requirements of the Act in this respect.

NUMBER OF APPLICATIONS FOR LICENCES NOT GRANTED AND GROUNDS FOR REFUSAL, 1934.

Breed.	Number refused	Percentage refused.	Disease. Whistling.	Roaring.	Sidebone.	Cataract.	Stringhalt.	Ringbone.	Bone Spavin.	Shivering.	Defective Genital Organs.	Poor Physique & conformation.	Inadequate Prolificacy.
PEDIGREE													
Clydesdale	1	0·7	1a	—	—	—	—	—	—	—	—	—	—
Percheron ...	1	1·5	—	—	—	—	—	—	—	1	—	—	—
Shire ...	20	2·3	4c	3	3	3c	1	1	1	1b	—	—	3
Suffolk ...	2	1·1	—	—	1	1	—	—	—	—	—	—	—
Hackney ...	1	8·3	—	—	—	—	1	—	—	—	—	—	—
Thoroughbred	1	0·7	—	—	—	—	1	—	—	—	—	—	—
Dales Pony	1	10·0	—	—	—	—	—	—	1	—	—	—	—
Fell Pony ...	1	10·0	—	—	—	—	—	—	—	—	1	—	—
Polo Pony...	1	9·1	—	—	—	—	—	1	—	—	—	—	—
Welsh Cob	1	5·6	—	—	—	—	1	—	—	—	—	—	—
NON-PEDIGREE													
Heavy ...	12	5·3	1	5d	3	—	—	1	1	—	—	1	—
Light ...	1	6·7	—	1	—	—	—	—	—	—	—	—	—
Pony and Cob	2	10·5	—	—	—	1	—	—	—	—	1	—	—
Totals ...	45	—	6	9	7	5	4	3	3	2	2	1	3

a. Also affected with roaring. b. Also affected with stringhalt. c. One also affected with roaring. d. One also affected with sidebone.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Nov. 28th.—Meeting of the Victoria Veterinary Benevolent Fund Ladies' Guild, at 10, Red Lion Square, W.C.1.

Nov. 28th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, 1, Wimpole St., W.

Nov. 30th.—Meeting of the Royal Counties Division, N.V.M.A., at Conway Hall, Red Lion Square, W.C.1.

Nov. 30th.—Meeting of the Midland Counties Division, N.V.M.A., at Birmingham.

Dec. 1st.—Meeting of the North of England Division, N.V.M.A., at Newcastle-on-Tyne.

Dec. 3rd.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.

Dec. 5th.—Meeting of the Lancashire Division, N.V.M.A., at Liverpool.

Dec. 7th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton.

PERSONAL

Dr. F. Ronald EDWARDS (Guy's and Liverpool), elder son of Mr. F. G. Edwards, F.R.C.V.S., Chester, was successful in the recent final examination for the diploma of Fellow of the Royal College of Surgeons of England.

The Colonial Administrative Service Appointment List contains the name of Mr. C. W. Wells, M.R.C.V.S., appointed as Veterinary Officer, Malaya.

R.C.V.S. OBITUARY

PURDY, James, Curraghmore, Mill Park Avenue, Hornchurch, Essex. Graduated New Edinburgh, April 21st, 1885; died November 12th, 1934, aged 71 years.

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FUNERAL OF MAJOR JOSEPH ABSON

In reference to the funeral of the late Major Joseph Abson, D.S.O., T.D., F.R.C.V.S., whose death we had the sad duty of recording in our last issue, the *Sheffield Telegraph* of November 17th, states, in the course of a full account:—

"The presence of a large and representative congregation in Ecclesall Church, Sheffield, yesterday, at the funeral service for Major Joseph Abson, of 6, Claremont Place, Sheffield, was a striking instance of the esteem in which Major Abson was held. He was both a national and local figure in his profession as a veterinary surgeon.

The service in the church was conducted by the Rev. H. E. Heinekey, Vicar of Drypool, Hull (cousin of Major Abson), assisted by the Rev. Canon H. W. Mackay (Vicar of Ecclesall).

The chief mourners were: Mr. F. B. Abson (son), Mr. Percy Abson, F.R.C.V.S., Nottingham (nephew), Mr. J. Elliott and Mr. W. Taylor (nephews), Mr. H. R. Laycock, F.R.C.V.S., (partner), Mr. J. Tomlinson (co-director of Messrs. Joseph

Tomlinson and Sons, Ltd.), Mr. F. C. Bedford (accountant), Captain H. Dawes, F.R.C.V.S. (West Bromwich), Mr. G. H. Locke, F.R.C.V.S., Stockport (President of the Royal College of Veterinary Surgeons), Colonel J. W. Brittlebank, C.M.G., (Rhyl), Mr. W. Woods, F.R.C.V.S. (Wigan), Mr. J. R. Unwin, and Mr. E. H. S. Outram.

The following veterinary bodies were also represented; National Veterinary Medical Association; Mr. W. Tweed (Chief Veterinary Officer of the Sheffield Corporation).

Yorkshire Division of the National Veterinary Medical Association: Mr. A. H. Watson, of Bradford.

Lancashire Division of the National Veterinary Medical Association: Mr. W. Woods, of Wigan.

North Midland Division of the National Veterinary Medical Association: Mr. F. C. Scott, of Pontefract.

The veterinary staff of the Sheffield Corporation: Mr. W. Tweed (chief veterinary officer), Messrs. S. H. Addison, H. M. Salusbury (assistant veterinary officers), and Mr. F. Unwin (meat inspector).

West Riding County Veterinary Staff: Major D. S. Rabagliati, and Mr. D. D. Canning.

Sir Charles Clifford (Hon. Colonel of the 71st W.R. Field Brigade, R.A. T.A.) represented the West Riding Brigade, Royal Field Artillery, with which unit Major Abson went to France; and the 71st West Riding Field Brigade, R.A., T.A., was represented by Colonel W. Howson and Captain E. W. Senior.

The Athenæum Club was represented by Mr. J. J. Parker (President), and Mr. G. J. Holroyd.

The Strafford Lodge of Freemasons was represented by Mr. V. E. Upton (W.M.); and the Royal Brunswick Lodge by Mr. G. L. A. Graefenhain, Mr. C. H. Payne, and Mr. A. Freeborough.

Members of the veterinary profession present, in addition to those already mentioned, were Lieut.-Colonel H. G. Bowes, Mr. W. Collinson, Mr. T. C. Fletcher, Major G. Green, Messrs. R. Hudson, W. H. Murgatroyd, S. H. Nixon, C. S. Smith, H. Thompson, and G. Tullis."

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FOOT-AND-MOUTH DISEASE IN DEVON

The existence of foot-and-mouth disease was confirmed on Tuesday among cattle and pigs at Kingsteignton, Newton Abbot, Devon. The area subject to restrictions in the movement of animals lies entirely in the County of Devon.

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"SHORTAGE OF QUALIFIED MEN"

Dr. Fred. Bullock, Secretary of the Royal College of Veterinary Surgeons, writing in last week's issue of *The Lancet*, says: "In your admirable leading article of November 10th—for which I should like to thank you in the name of the veterinary profession—you mention that the shortage of qualified men in the veterinary profession in this country at the present time is ominous. I am glad to be able to assure you that the shortage is likely to be but temporary. The number of admissions to the profession is steadily rising, and during the present year will probably be 25 per cent. higher than in 1933. The number of students in training at the five veterinary colleges is the highest ever recorded, and is sufficient to provide a graduation figure for the next five years double that of losses by death or otherwise."

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ACCREDITED MILK CONFERENCE

December 4th is the date fixed for the conference between the Ministry of Agriculture, the Ministry of Health, the Milk Marketing Board, the County Councils Association, and the Association of Municipal Corporations, which is to discuss ways and means of raising the general standard of purity of the milk supply. The conference will have before it the Milk Board's scheme and the recommendations of the Cattle Diseases Committee, which are preferred by the County Councils Association.

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VETERINARY INSPECTION IN OXFORDSHIRE

The report of the special sub-Committee appointed by the Agricultural Committee of the Oxfordshire County Council to consider the advisability of re-organising the veterinary services recommended that the County Councils Association be supported in its endeavour to secure assistance from the Exchequer towards the County Council's expenses in providing the necessary additional veterinary services.

The sub-Committee thought that the necessary veterinary work in the County, including the work which was at present undertaken by the part-time veterinary officers, could be performed adequately by two full-time veterinary officers at salaries of £500, rising to £700, together with travelling expenses. That would mean an additional expenditure of £1,400 to £1,600.

Although that would represent an increase in expenditure in the veterinary services of the County, the sub-Committee was inclined to the view that it would be of advantage to have two full-time officers to carry out the work in the County. The report was adopted.

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WHOLE-TIME VETERINARY SERVICE FOR CORNWALL

The Health Committee of Cornwall County Council, meeting at Truro, were concerned with the purity of the milk supply, and unanimously adopted a scheme for the appointment of a superintendent veterinary officer and an assistant.

A sub-committee reported that under the Milk and Dairies Order, 1926, a duty was placed upon the County Council to make such inspections of cattle as might be necessary and proper. The County Council had never taken any active steps regarding these inspections, and they were convinced of the need both in the interests of public health and of the dairy industry for the systematic inspection of dairy cattle.

This could, in their opinion, only be done by the appointment of whole-time veterinary officers. The work under the Tuberculosis Order, 1925, was at present carried out by the Diseases of Animals Sub-Committee through part-time veterinary inspectors, at an approximate cost of £1,000 a year, a considerable part of which would be saved by making these appointments.

The Chairman said that in view of the increased consumption of milk by school children and the responsibility thrown on the Public Health Committee, it was quite necessary that there should be adequate inspection to see that the milk was obtained from healthy cows under suitable conditions.

Mr. G. H. Johnstone, chairman of the Diseases of Animals Committee, strongly supported the proposals, which were unanimously adopted.

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SHROPSHIRE AND WHOLE-TIME VETERINARY SERVICE

Recommendations by a joint sub-committee that no action be taken at present in providing the contemplated veterinary services for co-operation in the Milk Marketing Board's scheme, were approved by the Public Health Committee of the Shropshire County Council, at a recent meeting,

and it was stated that the joint sub-committee considered that County Councils, particularly those with low rateable value in proportion to their cattle population, should not be called upon to bear the whole of the very considerable expense involved.

It was recommended that before the matter was again considered the county accountant prepare an estimate of the total cost of a whole-time veterinary service adequate for the purposes of the Board's scheme.

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ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army

Nov. 6th.—Maj. J. Smith retires on ret. pay (Nov. 6th).

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COLONIAL VETERINARY SCHOLARSHIPS

The following list gives the names of candidates selected for Colonial Veterinary Scholarships. Holders of these scholarships are, subject to vacancies being available, normally offered appointments in the Colonial Service after completing their training satisfactorily: Luke, D., Queen's, Belfast; Piercy, S. E., Durham; White, D. G., Edinburgh.

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ANIMAL DISEASE PROBLEMS IN INDIA

The *Times of India* of September 15th, states that the question of bringing the Imperial Institute of Veterinary Research at Muktesar up to its sanctioned strength by the provision of a nutritional research institute has been discussed by the Advisory Board of the Imperial Council of Agricultural Research, and that Colonel Olver's proposals have been approved by the Board. The idea of the scheme is to obtain information about diseases of stock throughout India, which would not otherwise be obtainable, and to have the nutritional aspects of disease investigated at a well-equipped central animal nutrition institute.

"The vast importance of the animal side of agriculture in India and the need for more intensive measures, especially research, for its improvement have often been stressed during the past few years, and received new emphasis in a discussion which has just taken place in the Advisory Board of the Imperial Council of Agricultural Research," says *The Times of India.*

"Colonel Olver pointed out that the main difficulty at present was that the Imperial Institute of Veterinary Research at Muktesar could not, for want of staff, satisfactorily deal with the mass of material becoming available. To overcome this difficulty he suggested that Government be asked to bring the Muktesar Institute up to its full sanctioned strength as quickly as possible. He further emphasised the necessity to hold an annual meeting of the disease investigation officers at Muktesar as proposed in the original schemes for dealing with the problem, so that they could meet and discuss their research difficulties with the research workers at the Institute and simultaneously keep themselves posted concerning the work going on there.

"Another suggestion of Colonel Olver's was that annual conferences of research workers should be held at each veterinary college in turn—a plan which would enable research workers, disease investigation officers, and others to meet and acquaint themselves with the work in progress. He pointed out that to investigate disease problems satisfactorily it was essential to have a central animal nutrition institute, at which the nutritional aspects of disease could be dealt with.

"There was an interesting exchange of views over this last proposal. It it not a new proposal, though little has yet been done to put it into practical effect. 'Colonel Olver showed that the real need is of a well-equipped central animal nutrition institute which would co-ordinate animal nutrition investigation work in the provinces and co-operate closely with the Muktesar Institute in the investigation of disease. 'One great advantage of working on these lines would be that a number of young men would thus be trained up in the proper prosecution of research and would be able to take on research appointments as and when required. In regard to the effect of nutrition on disease, it is essential to have team work between nutrition workers and veterinary workers,'" said Colonel Olver.

"The advocacy of the provision of a nutritional research institute was cordially supported. The Board adopted the Committee's report and decided that the necessity of bringing the Imperial Institute of Veterinary Research at Muktesar up to its full strength should be impressed on the Government of India."

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SHIRE HORSE SOCIETY

At their final meeting for the year 1934, the Council of the Shire Horse Society approved for circulation the schedule of the forthcoming London Show. Nearly £1,800 is again offered in prizes and the classification remains as at the last Show except that a class for two-year-old geldings has been introduced, and the class for commercial teams of three or four has been omitted.

It was announced that Messrs. T. Eaton Jones, F.R.C.V.S., J. G. Runciman, M.R.C.V.S., and Henry Sumner, Jun., M.R.C.V.S., have accepted the Council's invitation to officiate as Veterinary Inspectors, with Major-General Sir John Moore as Appointments Judge.

The stallion and gelding classes are to be judged on Tuesday, January 29th, and the mares and produce groups on the following day, on the afternoon of which the champion stallion, mare and gelding will be selected. The closing day (Thursday) will again be set apart for the Auction Sale in the morning, and the Commercial Horse Classes in the afternoon.

Consideration was given to the provision of classes for Shires at the 1935 Royal Show at Newcastle-on-Tyne, and it was agreed to repeat the 1933 schedule with the addition of a special class for Teams. £253 was voted for this service, and a Special Committee was appointed to arrange for the allocation of this sum, as apart from prizes it is hoped to offer transport facilities also.

The Annual General Meeting of Members was fixed to be held at the Royal Agricultural Hall on Wednesday, January 30th, 1935, and Council Meetings at 12, Hanover Square were provisionally arranged for Tuesday, January 8th, Tuesday, April 9th, Tuesday, September 24th, and Tuesday, November 12th.

In submitting the names of 16 candidates for election to membership of the Society, the President (the Duke of Devonshire) observed that the total number of new members admitted during the year was 145. This represented an increase of 50 per cent. over last year, and he thought that this alone was a fair indication of the improvement which had been effected in Shire Horse trade in 1934. A definite example of the improvement was the fact that only that day he had heard of a deal whereby five Shire geldings had changed hands at a sum exceeding £600.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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REPORT OF THE CATTLE DISEASES COMMITTEE OF THE ECONOMIC ADVISORY COUNCIL

To the Editor of the Veterinary Record

Sir,—You will no doubt realise that the Special Committee, set up by the Council of the N.V.M.A., is at present endeavouring to formulate a scheme whereby the services of the veterinary profession can best be utilised throughout the agricultural districts of the country. The object of this Committee is to arrive at an agreed scheme which will give the optimum benefit to the stock-owner and to the consuming public. It is felt that this scheme, which is nearing completion, should be launched with the common consent of the profession as a whole. In view of this wish, the realisation of which we venture to think is imminent, we would, at this juncture, ask individual members of the profession to refrain from placing their own individual views before the public or before interested outside bodies. The Committee has no desire to stifle original thinking, rather would it encourage it, but it feels sure after its recent consideration of a large number of individual views submitted to it, that it is only in matters of detail that disagreement exists. It is felt, therefore, that publication of such views at this time is likely to confuse the general issue unnecessarily and might divert discussion from, and perhaps raise opposition to the main scheme on matters of comparatively little significance.

I am, Sir,
Yours faithfully,
William Nairn.
Chairman, N.V.M.A. Committee on the Report of the Cattle Diseases Committee of the Economic Advisory Council.

2, Verulam Buildings,
Gray's Inn,
London, W.C.1.
November 12th, 1934.

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"QUACKERY"

To the Editor of the Veterinary Record

Sir,—In connection with the law report in your issue of November 10th, is there nothing that can be done to safeguard the general practitioner and the public, against the ever increasing number of "quacks" in small animal practices?

A number of these people are, of course, recruited from the ranks of dismissed employés of the P.D.S.A., some are ex-kennelmen and some are dog breeders. They usually operate by opening shops and calling themselves "Canine Specialists," and apart from treating, and prescribing for, animals, advertise to operate under anæsthetics. They invariably sell dogs in these shops, besides patent medicines and canine requisites.

Such "quacks" are becoming so numerous in some districts that it is a wonder how they all make sufficient on which to live.

A serious aspect of the position is, that many of the public are not aware that the "quacks" in question are not qualified men—a revelation that causes them great astonishment.

Many breeders start by having a dog shop with no idea beyond selling pups and the usual canine requirements. As a side line they also bathe, trim, strip and prepare dogs for shows. This harmless beginning too often develops into the selling of proprietary medicines, with advice as to their use, and the road from that to open "quackery" is all too short.

My own district is infested with such places; admittedly most of them do not last long, but when they fail, or make a mess of things, in one town, they move on to another. Such people are free to advertise as they please, and are under no compulsion to warn the public that they have no proper qualification for the work they undertake. Which brings me to the very serious question of the nature of the treatment these people often inflict upon helpless animals. In extreme cases the R.S.P.C.A. may intervene, but frequently the very inadequacy of the treatment will prolong an animal's suffering.

Surely in England our profession is strong enough to deal effectively with so serious a matter? In Southern Ireland it has apparently done so.

Yours faithfully,
S. F. J. Hodgman.

101, Bromley Road,
Shortlands,
Kent.
November 16th, 1934.

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PLANT POISONING OF LIVESTOCK

To the Editor of the Veterinary Record

Sir,—We, the undersigned, are conducting certain investigations into the toxicity of many plants when eaten by domestic animals. Many cases of plant poisoning occur, and country practitioners especially, must possess a fund of information on the subject locked in their case books.

We should be very grateful if any practitioners who may have records of such cases would communicate particulars to either of us at the Royal Agriculture College, Cirencester. In order to facilitate the rendering of the necessary information, it is proposed to issue at an early date to all veterinary surgeons in country practice, a short questionnaire, and we should much appreciate replies giving the details of cases which have come within their knowledge.

Yours faithfully,
A. C. Duncan, F.R.C.V.S.
Geo. Redington, D.Sc.

Royal Agricultural College,
Cirencester.
November 20th, 1934.

The Editor acknowledges, with thanks, the receipt of the following:—

Communications from Mr. A. Alexander (Salford), Major-General Sir John Moore (London), and Mr. U. F. Richardson (St. Albans).

Report of a meeting of the Midland Counties Division, N.V.M.A., from Captain Howard Dawes (Hon. Secretary).

Advertiser's Announcement

Mitchell's Pyro-Puncture Firing Iron

This instrument was invented by Mr. Robert Mitchell, M.R.C.V.S., of Glasgow and proved to be of interest when exhibited by C. J. Hewlett and Son, 35 to 42, Charlotte Street, London, E.C.2, on their stand at the N.V.M.A. Annual Congress at Edinburgh.

The needle passes through the bulb of heated metal, and can be withdrawn within it or extended at will by merely pressing on the handle grip. It has been used effectively by Mr. Mitchell for a number of years.